MECHANICAL HANDLING
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TECHNICAL PROGRESS

TECHNOLOGICAL PROGRESS daily gathers momentum. Developments follow one upon the other with startling rapidity. So much so that one frequently hears of reluctance to install new equipment on the grounds that by the time the installation is completed, some new developments may have made it obsolete.

Sometimes, perhaps, this attitude can be justified; more frequently it cannot. Usually it is merely an excuse for failing to face up to the problems involved. An intelligent appreciation of the likely shape of future progress is an essential part of management's responsibility. Adoption of a negative attitude is to admit defeat. To remain up to date to-day, management must constantly be looking to the future, assessing the trends not only of consumption and demand but also of production techniques, and planning its policy accordingly.

It is true that some instances have been reported of new equipment being installed only to be left idle shortly afterwards owing to a falling off in demand for the factory's products. This is an eventuality that is not always foreseeable, even by the most enlightened management. It is worth remembering, however, that if an industry is passing through a difficult phase, the use of antiquated equipment will not help it to get on its feet again. And the firm with modern plant already installed will be in a better position to meet competition when conditions do improve. In fact, any firm which clearly foresees a difficult time ahead would do well to consider whether the use of improved production and handling plant may not alleviate the very difficulties envisaged.

Also to be considered in a rapidly changing industrial situation is the fact that amortisation periods may need to be much shorter than has hitherto been necessary. Whereas, in the past, it may have been possible to amortise a new piece of equipment over 10 or 20 years, it may now be necessary to write it off within five years or even within one or two years. This factor must be balanced against the savings in operating costs which the equipment is estimated to achieve, and decisions made accordingly.

The principal lesson to be learned to-day is that no industry can stand still; either it advances, or it falls steadily behind in the march of progress. The willingness to investigate new ideas, and to act decisively on the results of such investigations, is now a vitally important part of management's responsibility.

SEVENTH MECHANICAL HANDLING EXHIBITION - 1960

The Seventh Mechanical Handling Exhibition (organized by this journal) will be held next year at Earls Court, London, from Tuesday, May 3rd, until Friday, May 13th. Make a note.

Pour les lecteurs de l'étranger
Für unsere ausländischen Leser
Para los lectores de ultramar

SUMMARY OF CONTENTS

For readers overseas

SOMMAIRE EN FRANÇAIS

INHALTSÜBERSICHT AUF DEUTSCH

und Entnahmegeräte und Transferstrassen von Presse zu Presse konnte der Zeit- und Geldaufwand für die Herstellung der Pressteile, die fast immer durch eine grosse Zahl von Pressstationen laufen müssen, wesentlich herabgesetzt werden. Die Anwendung dieses automatischen Systems hat auch zu einer weiteren Steigerung des ohnehin schon hohen Sicherheitsniveaus geführt.

Die Anwendung von Magneten bei Hubvorrichtungen Seite 382
Von L. J. Hoefkens
Aus der begrenzten Anwendung von Elektromagneten in Fabriken dürfte zu schliessen sein, dass ihre ausserordentliche Nützlichkeit und Wirksamkeit als Materialumschlagelement nicht in vollem Masse erkannt worden ist. Elektromagneten haben keine sich bewegenden Teile, erfordern nur sehr geringe Wartung und fallen selten aus. Auch haben sie keinen grossen Energieverbrauch, der sich ohnehin nur auf die eigentlichen Einsatzzeiten beschränkt. Als Anleitung zur zweckmässigen Anwendung von Elektromagneten werden ihre Möglichkeiten und Begrenzungen beschrieben, worauf eine Beschreibung verschiedener Vorrichtungen aus der Praxis folgt.

Materialförderung in einem modernen Binnenlandkraftwerk. Teil I Seite 385
Umschlag von Kohle aus Eisenbahnwagen
Von J. M. Beskine, B.Sc.(Eng.)
In allen Teilen Grossbritanniens befinden sich jetzt neue Kraftwerke, die im Binnenlande und fern von Häfen und Wasserwegen gelegen sind, auf denen Kohle das ganze Jahr hindurch billig transportiert werden kann. Es muss also die Kohle unter Anwendung von Kippwagen und ähnlichen Entladevorrichtungen auf dem Schienenwege herbeigeschafft werden. Ein typisches Beispiel für ein kürzlich inbetriebgenommenes Binnenlandkraftwerk, das völlig von der Eisenbahnbelieferung abhängig ist, ist das neue Kraftwerk Goldington, das etwa 4,8 km von der Stadt Bedford gelegen ist.

Entwicklungen auf dem Gebiet der Kransteuerungen Seite 395
Von G. V. Sadler, M.I.E.E.
Dieser Artikel befasst sich mit den Entwicklungstendenzen in bezug auf Hubwerke mit besonderer Rücksicht darauf, was am Kranhaken vor sich geht. Die Grundvoraussetzungen für die Hakenleistung eines Krans werden besprochen und die verschiedenen Kransteuersysteme erklärt.

Eine neue Steuerautomatik für grosse Industrietriebwerke Seite 401
Eine Neuentwicklung auf dem Gebiete der automatischen Steuerung zur Steigerung der Wirksamkeit und Güte in der Stahlfabrikation wird von der Metallindustrieabteilung der English Electric Co., Ltd., Stafford gezeigt. Ein Vorführwagen wurde mit einer Anlage in voller Grösse zur Steuerung eines im Massstab 1:8 ausgeführten Funktionsmodells eines Walzwerks ausgerüstet. Ein Spezialisten-Team der English Electric fährt mit diesem Wagen herum, um Industriellen die Anwendungsmöglichkeiten der neuen Anlage bei der automatischen Steuerung von Arbeitsfolgen und Fabrikations-vorgängen vorzuführen.

Vorführung eines Michigan-Tieflöffelbaggers an einer Baustelle der öffentlichen Hand Seite 402
Ein Abwasserproblem auf dem Ausstellungsgrund des Ministeriums für öffentliche Arbeiten wurde unter Anwendung eines Michigan-Schürfladers mit Tiefbaggervorrichtung schnellstens aus der Welt geschafft. Dieses neue Michigan-Kombinationsgerät wurde zum ersten Male gezeigt, und es wurde ihm die Aufgabe gesetzt, in zwei Tagen etwa 305 m Graben auszuheben, und zwar in einer Durchschnittstiefe von 1,2 m.

Inbetriebnahme des 5. Hochofens in Margam Seite 403
Der neue Hochofen Nr. 5 in den Margam-Werken der Steel Company of Wales wurde vor kurzem inbetriebgenommen. Der Ofen ist einer der Hauptanlagenteile, die im Rahmen des £52-Millionenprojektes M der Gesellschaft errichtet werden sollen. Der Hochofen mit seinem Gestelldurchmesser von 9,4 m und seinem nutzbaren Volumen von 1,662 m³ ist einer der grössten der Welt. Er hat eine Eisenproduktionsleistung von über 10,000 t pro Woche.

Giessereiausstellung Seite 410
Mit 97 Ausstellern war die in Birmingham abgehaltene und vom Verband Britischer Fabrikanten und Lieferanten für das Hüttenwesen geförderte Giessereiausstellung die grösste ihrer Art, die jemals in Grossbritannien stattgefunden hat. Eine Kurzbeschreibung der bedeutendsten Ausstellungsstücke wird nachfolgend gegeben.

1. internationale Konferenz des Instituts für Fördertechnik Seite 422
Die in London abgehaltene 1. internationale Konferenz des Instituts für Fördertechnik war wohl das vielseitigste Projekt, das seit Gründung des Instituts im Jahre 1952 veranstaltet worden ist. 300 Konferenzteilnehmer u.a. auch aus 9 anderen Ländern hatten sich eingestellt. Das allgemeine Thema der Konferenz befasst sich mit der Förder- und Hebetechnik im neuen Europa.

SUMARIO EN ESPAÑOL

Sistema planeado de transportadores que ayuda a una producción maxima Pág. 376
Viene descrito en detalle el sistema de transportadores 'En Masse' para la manipulación de materiales a granel en los talleres de Andrews Liver Salts.

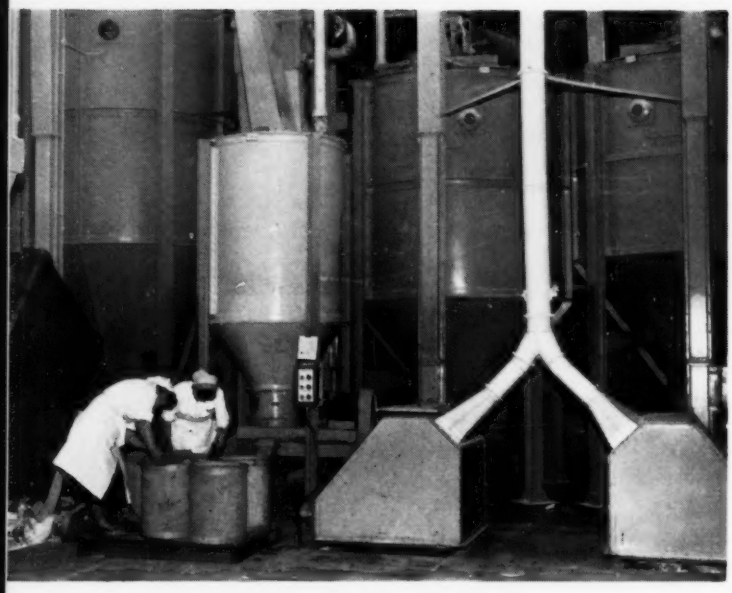
Manipulación de materiales en el nuevo taller de prensas de la Vauxhall Pág. 378
Por un colaborador especial
El moderno taller de prensas de la Vauxhall Motors, en Luton, constituye un magnífico ejemplo de los progresos que recientemente se han logrado en la manipulación automática de materiales en gran escala. La introducción de dispositivos para la carga, eyección y extracción automáticas, asi como de los sistemas de traslado automático de prensa a prensa, ha reducido muchísimo el tiempo, la mano de obra y el costo en la producción de piezas estampadas, las cuales casi siempre tienen que pasar por muchas etapas de prensado. El uso de ese sistema automático ha conducido asimismo a una mejora en las ya altas normas de seguridad.

El uso de electroimanes para manipulación de materiales Pág. 382
Por L. J. Hoefkens, A.Inst.Prod.E.
Por las pocas aplicaciones de los electroimanes en las fábricas parece que no se aprecia o conoce suficientemente su extrema utilidad y eficiencia en la manipulación de materiales. Los electroimanes no tienen piezas móviles, requieren muy poca atención, y raramente fallan en servicio; ni tampoco requieren mucha energía para su funcionamiento, y aun la que necesitan se requiere solamente en el curso preciso de la acción de elevar o trasladar. Con objeto de que se pueda elegir correctamente el electroimán adecuado para cada aplicación, el autor describe sus posibilidades y limitaciones, añadiendo una descripción de varios ejemplos en su funcionamiento real.

Movimiento de materiales en una moderna central eléctrica del interior. Parte I: Movimiento de carbones traídos por ferrocarril Pág. 385
Por J. M. Beskine, B.Sc.(Eng.)
Hay en la Gran Bretaña en el momento actual un número bastante crecido de grandes centrales eléctricas de reciente construcción que se hallan situadas en el interior, a distancia de todos los medios de transporte por agua, ya sea marítimos, fluviales o de canales, que sean adecuados para el transporte barato y rápido de carbón a granel en todas las épocas del año. No puede evitarse hacer uso del ferrocarril para traer el carbón a esas centrales eléctricas del interior, empleándose para ello basculadores de vagones y otras instalaciones análogas para la descarga de vagones. Un ejemplo de las centrales eléctricas del interior recientemente puestas en servicio, que dependen enteramente del ferrocarril para su aprovisionamiento, lo proporciona la nueva central de Goldington, situada a unas 3 millas (4,8 km) del centro de la ciudad de Bedford.

(*continued on page* 436)

PRE-PLANNED CONVEYOR SYSTEM AIDS PEAK PRODUCTION



The basic materials of Andrews—mainly raw sugar, tartaric acid, sodium bicarbonate and magnesium sulphate—are received in the goods-intake warehouse on the north side of the Winthrop Laboratories, Ltd., factory at Newcastle upon Tyne

After re-weighing and check-testing, the separate ingredients are passed by elevator lines into a battery of bins and two-stage circular bin-dischargers, some of which are seen here.

Note the 'Tidal Control' unit, set in the side panels of the storage bins. This simple device controls and maintains the level of the particular material in the discharger. Any overloading or falling-off in this level means that the conveyor lines to the bin are automatically controlled to maintain a predetermined bin content

THE MANUFACTURE of Andrews Liver Salts was first begun in 1893 in Newcastle, near the old parish church of St. Andrew, Gallows Gate (from whence, it is said, the product gets its name).

In the 65 years that have elapsed since then, the sales of Andrews have increased by leaps and bounds and to-day many hundreds of thousands of tins are packed every week not only for the home market but for export to more than 70 overseas markets.

Andrews is now manufactured for the proprietors, Scott & Turner, Ltd., by Winthrop Laboratories, Ltd., their associate company, in the Andrews Division of the new £2 million plant at Edgefield Avenue, Newcastle upon Tyne, which was opened a comparatively short time ago.

When the factory existed only on the drawing board, Winthrop engineers had thoroughly examined the problems of quick and easy storage of the raw materials, rapid and efficient elevating and conveying, and other problems posed in their effort to achieve a high level of production for the product.

Redler Conveyors, Ltd., of Stroud, Glos, were called in at the planning stage. An intricate yet fundamentally simple system of mechanization was worked out for receiving the raw materials and feeding them through the various processes to their ultimate destination—the tin-filling machines.

The Edgefield Avenue plant was tailor-made to fit the conditions. It is a single-storey building of some 300,000 sq. ft. The north side contains the reception warehouse with intake from road and adjacent rail-head, the centre wing being allocated to manufacturing, whilst the south-side block is used for the despatch of the cartoned goods. Adjacent to the Andrews Liver Salt department is a tin-printing and tin-box-making plant, where 4- and 8-oz. Andrews tins are made and printed in 28 different languages.

Andrews is produced to a number of formulae but the chief ingredients are tartaric acid, sodium bicarbonate, magnesium sulphate, and sugar.

As these constituents are received in the north-side reception bays, samples are taken for immediate laboratory check-testing. Each respective ingredient is then elevated by totally enclosed dust-tight elevators to a battery of circular bins each fitted with a Redler two-stage bin-discharger. In these dischargers, which can handle thousands of pounds of the raw material hourly, the material is made to flow into a second chamber where a rotating feeder carries it to a discharge outlet.

By means of the bin-dischargers, a constant flow-rate is maintained. Each storage bin is fitted with a 'Tidal' bin-level controller, which maintains the level of the particular material in the storage bin. At overloading or falling-off in level, the flow rate is automatically adjusted to maintain predetermined bin content.

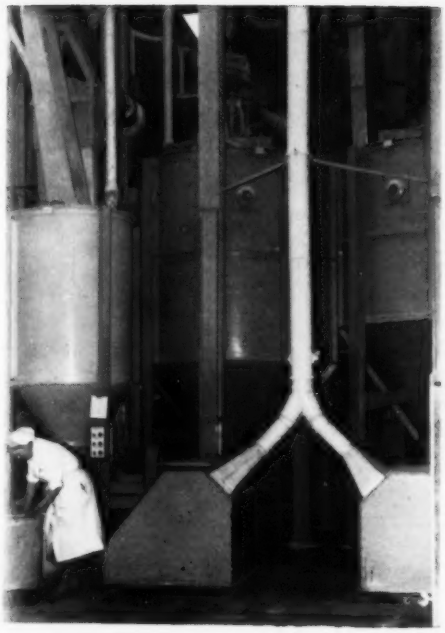
The various ingredients of the Liver Salts are then fed, as required, by skeleton-type chain links enclosed in hygienic, dust-tight Redler conveyor shafts and are 'flowed' to a series of fully automatic weighing machines, where each separate ingredient is accurately weighed. The conveyors are driven by low-power electric motors.

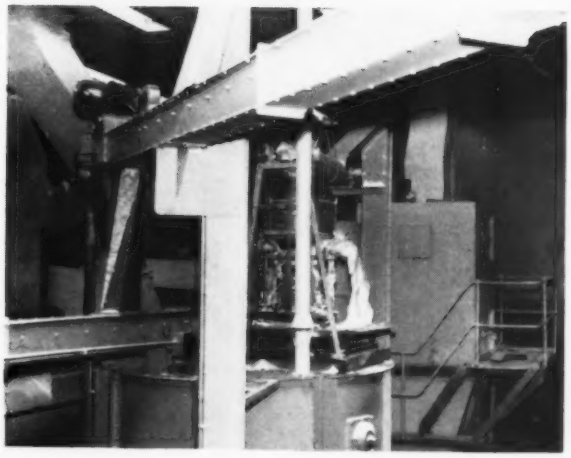
The ingredients then travel slowly over a set of drying decks where all surface moisture is eliminated.

This is followed by the mixing and blending process; in the enclosed conveyor lines the materials flow en masse to the mixing hoppers. Having been thoroughly mixed and blended they are conveyed to a battery of storage bins equipped with Redler circular bin-dischargers from which they pass on to the final filling processes.

At each stage in the cycle of manufacture, check tests are made of the individual and blended ingredients by qualified laboratory staff to ensure that the highest possible standards may be maintained.

In the filling bays, a circuit conveyor system is in operation. It enables the Andrews Salts to be drawn off as required from any of the storage hoppers and relayed into the two conveyor circuits that feed the home and export filling machines. The conveyor system recirculates any surplus salts that remain undistributed, but will not accept additional loading when the line is full. This prevents any choking of the circuit.

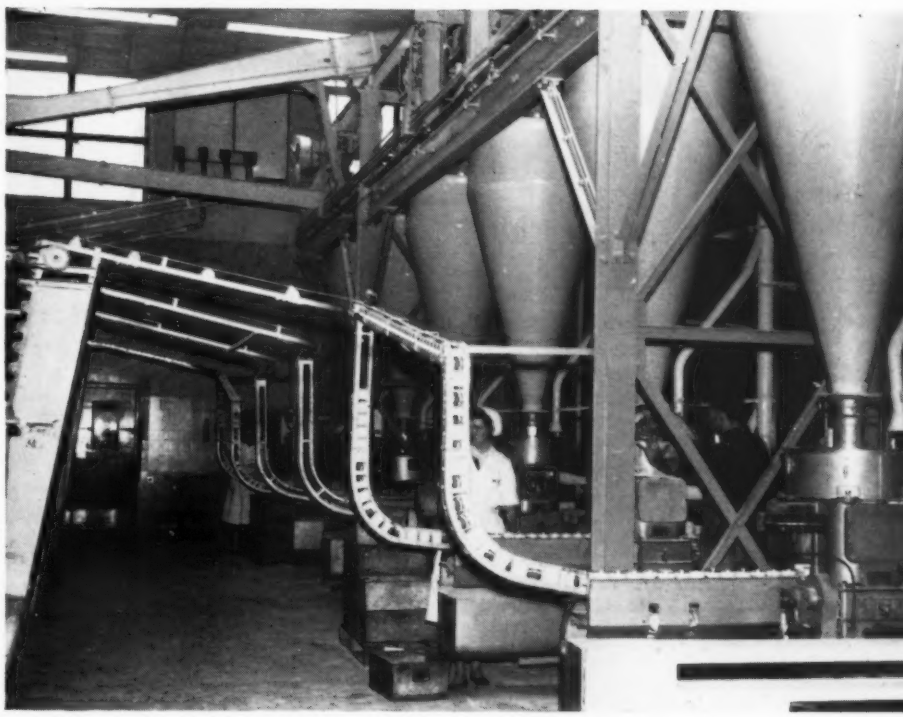




ABOVE
Another view of some of the bins and two-stage circular bin-dischargers which handle the raw materials for Andrews

TOP RIGHT
Having been drawn from the bin-dischargers at a constant flow-rate into dust-tight totally enclosed elevators, the raw materials are weighed on automatic machines. The picture shows the conveyors and elevators concerned with the processing of magnesium sulphate

RIGHT
The control panel shows at a glance the state of the storage and discharge bins, the rate of flow along the elevator and conveyor lines, and the quantities of materials currently being dealt with by the mixers and filling machines



RIGHT
At the end of the line, empty Andrews tins from the adjacent tin-making and tin-printing plant are rolled along chutes for their filling. The circuit conveyor system enables the salt to be drawn off from any of the storage hoppers and fed to the two conveyor circuits that feed thefilling machines

The filling machines in the bay deal with 4- and 8-oz tins for the home trade and the specially printed 8-, 4- and 2-oz tins for the overseas markets.

The complete system of elevating, conveying, storage and distribution is controlled from a master panel, which shows at a glance the stage of the various functions in the chain of operations.

So, by the complete mechanization of one of the country's most modern and hygienic manufacturing plants, a weekly production of nearly a million tins of Andrews may be achieved.

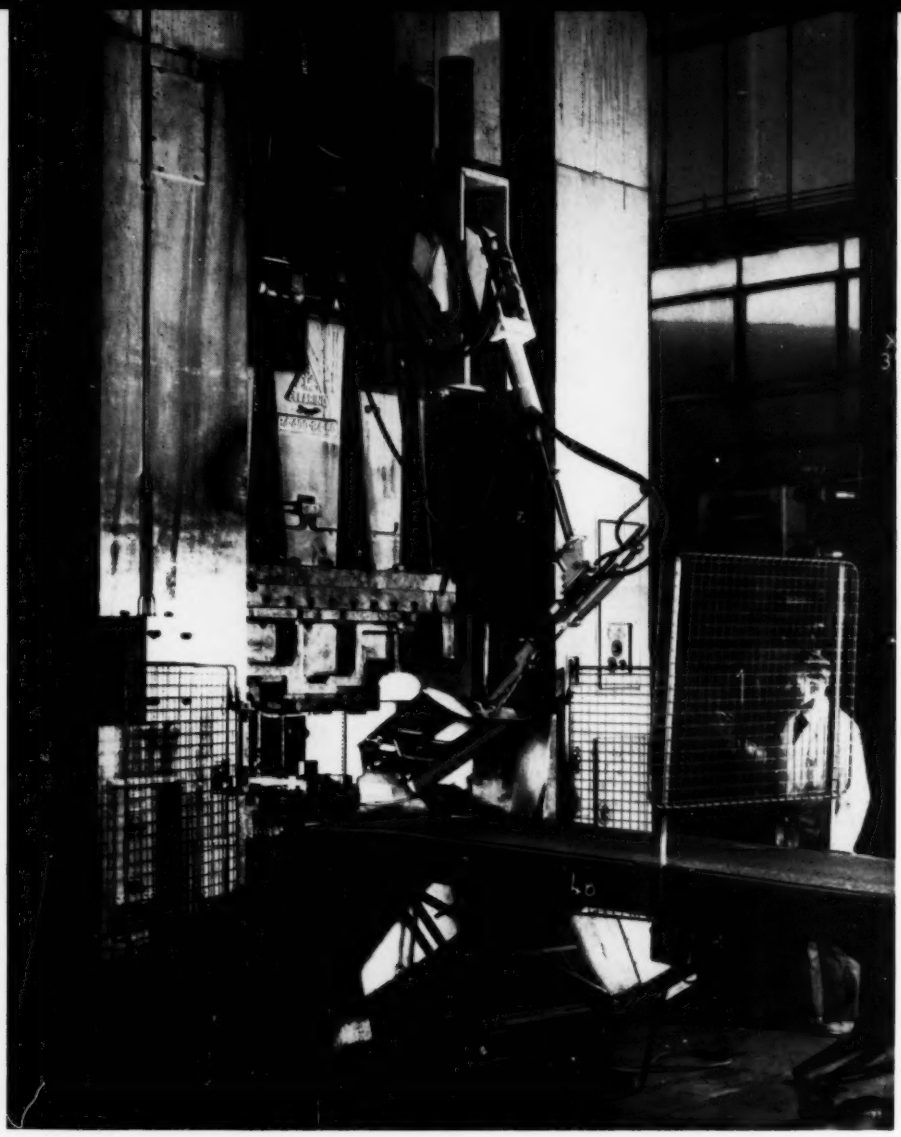


Fig. 1. Automatic Jaw-Type Extractor. *This photograph shows an inner door panel being removed from the press by an automatic, pneumatically controlled jaw-type extractor and then placed on an inter-press conveyor. The jaw, which moves forward and grips the pressing, is controlled by a Maxam air cylinder*

Materials Handling at the New Vauxhall Press Shop

BY A SPECIAL CONTRIBUTOR

THE MODERN Press Shop at Vauxhall Motors, Luton, provides an excellent example of the recent progress which has been made in large-scale automatic materials handling. The introduction of automatic loading, ejecting and extracting devices and inter-press transfer systems has greatly reduced the time, labour and cost involved in the production of a pressing which nearly always has to pass through many press stages. The use of these automatic systems has also led to the improvement of already high safety standards.

These systems, in effect, provide linked automation for lines of presses. Use is made of basically standard and interchangeable units, which can easily be adapted for particular needs, and they allow for considerable flexibility in the linking of various presses. For example, short-run conveyors, turnover devices, shuttle loaders, etc., can be used progressively to provide linked automation—a more flexible and cheaper system than the use of in-line transfer machines.

The automatic loading, ejecting, extracting and inter-press transfer equipment is operated by compressed air and consists essentially of a system of valves and air cylinders, remote controlled and synchronized with the stroke of the press. Vauxhall Motors have standardized on fluid power control equipment manufactured by Maxam Power, Ltd., a company of the Holman Group, Camborne, Cornwall, for use in the Press Shop.

Vauxhall have recently completed a £36-million expansion and modernization programme at the Luton and Dunstable factories. The new Press Shop at Luton is an important part

of the scheme and covers, apart from stores areas, etc., an area of nearly 210,000 sq. ft. It houses 222 new presses of which 130 are heavy presses ranging in capacity up to 1,500 tons and in width from 72 in to 156 in. Most of these are of the under-drive type, mounted over a continuous basement which contains off-cut conveyors and a scrap-baling system. The emphasis in the design of this new department, which also includes steel stores, panel stores, welding and inspection areas, has been towards space economy and easy accessibility of all machinery and conveyor systems and at the same time to provide ample room between 25 press lines for the transportation of equipment and sheet steel with which the presses are fed.

The automatic materials handling systems described here have made an important contribution to the increase in the production capacity of the Press Shop. The systems include 'Iron Hand' devices for extracting pressings from the dies and placing them on inter-press transfer units or conveyors, tension breaking ejectors and side-lancing equipment mounted within the presses, and automatic loading, pre-bending and turnover machines.

The Iron Hand

All medium and heavy presses of up to 1,500 tons capacity are fitted with automatic jaw-type extractors. These extractors incorporate Maxam cylinders and valves which cause the carrying arm and jaw mechanism to move in the required directions. Extraction is controlled by an electro-pneumatic signalling system, the sequence being started by means of a rotary, cam-operated, multi-switch driven by gearing in synchronization with the eccentric shaft of the press.

The extractors are mounted at the rear of the presses and move forward to grasp a pressing and lift it clear of the die immediately the press ram moves upward. The arm, which supports the jaw unit, is then moved outward from the press and at the completion of its stroke the jaw opens to release the pressing on to a conveyor or turnover machine. The arm is then returned to its original position.

The Maxam equipment for each extractor unit comprises three double-acting air cylinders, a solenoid valve and two air-controlled valves, two bleed reservoirs for timing purposes together with two restrictor needle valves for each reservoir, and two micro-switches. One micro-switch is operated by the rotary cam switch mounted to the press, and the other is mounted to the jaw unit and determines the point when the jaw releases the pressing.

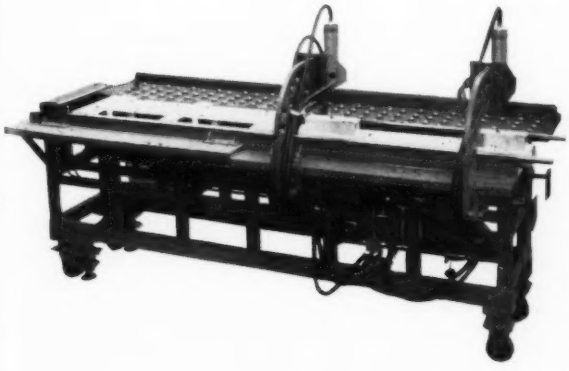
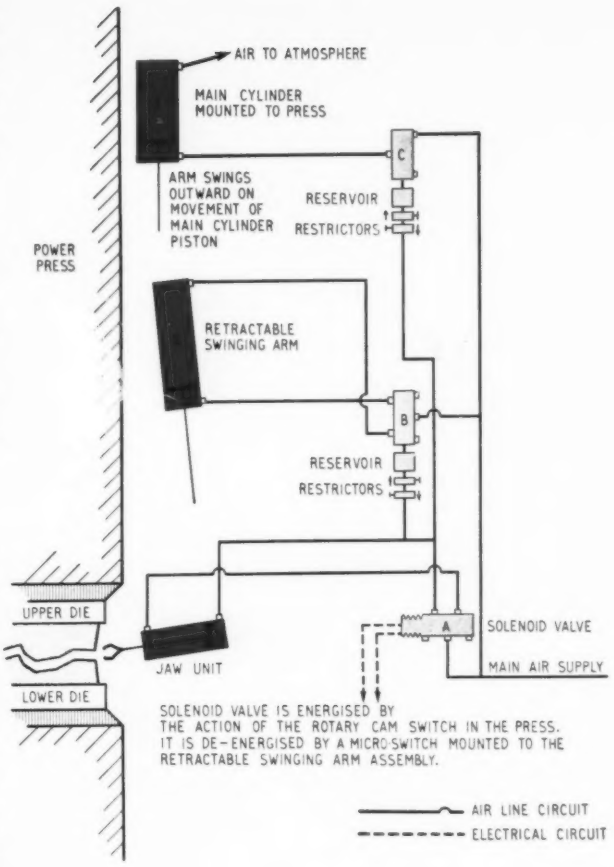


Fig. 2. Shown in this photograph is a pneumatically controlled pre-bend and loading machine which is used to form sheet steel before it is fed into a power press. The sheet steel is loaded on to a shuttle carriage on the left of the machine by the operator. It is then automatically passed to the right on to the bending platform



Air and electrical circuits for extractor unit

The following description and accompanying diagram of the air line circuits and pneumatic equipment used in each extractor unit explains a single operating cycle.

At the beginning of the cycle the arm is in the resting position and the jaw is open as shown in the diagram. As the press ram moves upwards on completing a pressing and rotary cam-operated micro-switch closes an electrical circuit causing solenoid valve 'A' to be energized. The valve member moves and air passes to jaw unit cylinder 1 causing the piston to move forward. At the same time air passes through two sets of restrictors and reservoirs to operate valve members in air-operated valves 'B' and 'C'. Following a short delay (which can be varied from 0-7 sec) while air is passing through these restrictors and reservoirs, air passes to the bottom of cylinders 2 and 3. Cylinder 2 raises the jaw unit and the pressing it holds clear of the die while cylinder 3 operates causing the arm to move outwards from the press. During the outward stroke of the arm a second micro-switch is tripped which de-energizes the solenoid valve 'A'. The resulting movement of the valve member allows air to pass to the front of jaw unit cylinder 1. Cylinder 1 piston retracts and thereby opens the jaw and releases the pressing at the predetermined point. De-energizing of solenoid valve 'A' also causes, after a time delay, the valve members of valves 'B' and 'C' to move causing cylinders 2 and 3 to return the arm and jaw unit to the resting position. The slow escape of air through the reverse restrictor valves ensures gentle return movement of the arm.

Adhesion Breaking Ejectors and Side Lancers

The second type of pneumatic servo equipment used in the press shop, though smaller and less complicated in design than the jaw-type extractor, is none the less of great importance.

At the completion of a press stroke there is considerable adhesion between the surfaces of the pressing and the lower die caused by the pressures exerted by the press rams. This adhesion must be broken so that the pressing may easily be removed from the press by the extractor. Ejection is achieved by means of Maxam air cylinders which are built into the lower die and which operate when the rotary cam multi-switch has caused a Maxam solenoid valve to be energized. Air passes to the bottom of the ejector cylinders causing the pistons to rise. Before the next steel sheet or pressing is loaded on to the lower die the rotary cam switch again operates and de-energizes the solenoid valve. This allows air to pass to the top of the ejector cylinders causing the pistons to return to their original position.

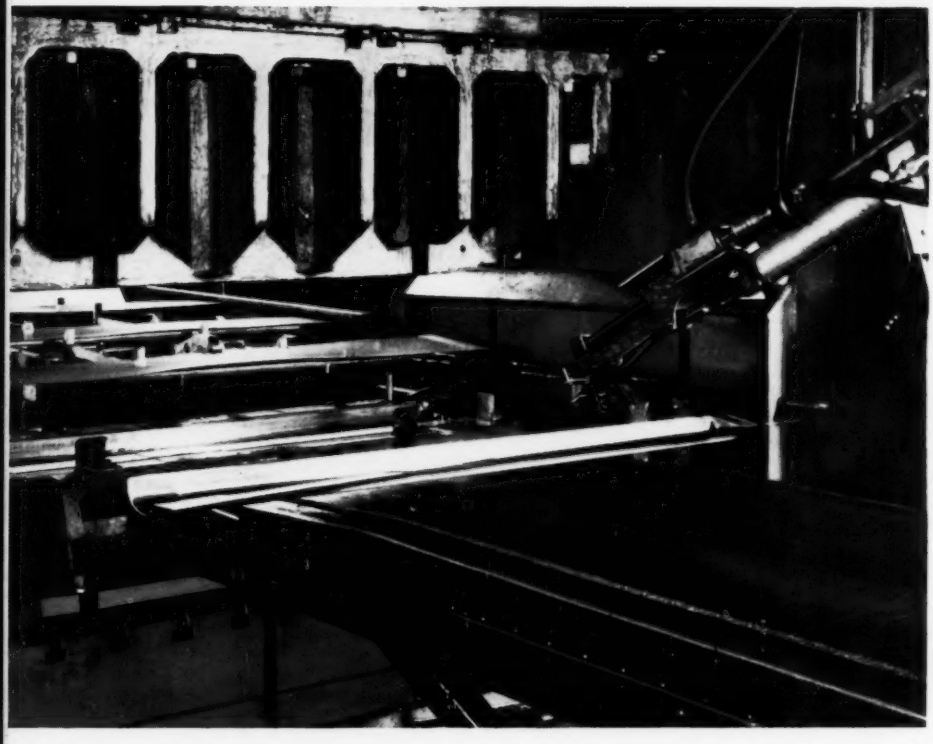
The side-lancing of a pressing presents a problem because the use of complicated dies often results in angled die surfaces which are opposed to the thrust direction of the press rams. This means that side-lancing of, say, an inner door panel or inner boot lid cannot be carried out in the normal manner by the standard mechanism within the press but has to pass through possibly up to four more presses, each angled side having to be presented horizontally to the press rams. This is a very costly process involving the casting and proving of up to four additional sets of dies and the use of four presses in a press line purely for lancing operations.

The problem has been effectively and successfully overcome by the use of built-in air cylinders which carry lancing punches at the ends of the cylinder pistons and which are mounted within the dies at 90 deg angles to the surfaces to be lanced. This means that a single press can carry out side-lancing operations while a pressing is being formed, and at a resultant saving in cost, etc.

The side-lancing Maxam punch cylinders operate when the press rams come together and are controlled by the rotary cam multi-switch in the press and a solenoid valve in the manner described for ejecting operations.

Loading, Pre-bending and Turnover Machines

In speeding up production at this large press shop full use has been made of mobile, pneumatically operated loading stations of various types, and of pre-bending and turnover machines. These machines are designed by save labour, time and cost and do away with complicated die operations. The principle of operation is the same for all such machines and they are all operated by Maxam cylinders, valves, micro-switches and bleed reservoir units, etc., controlled through the electrical signals generated by the rotary cam multi-switch and synchronized with the stroke of the press.



ABOVE

Fig. 3. Automatic Loading Machine. *This shows part of the standard shuttle loader in use in the Vauxhall Press Shop. The loader carries three steel sheets and the loading into the press is synchronized with the press stroke. The sheet nearest to the press is fed on to the die by means of an air-controlled jaw unit which in this photograph is about to grip the sheet*

LEFT

Fig. 4. *This illustration shows a close-up view of the jaw mechanism and controlling Maxam air cylinder of a jaw-type extractor immediately after it has placed a body sill outer panel pressing on an inter-press transfer station*

Loading Machines

The most commonly used loading machine is the standard portable shuttle loader which passes steel sheets or pressings into the press in continuous cycles.

Each shuttle loader operates by the use of two Maxam double-acting air cylinders, a solenoid valve, two roller actuated valves and an air-operated valve. The solenoid valve is energized by the rotary cam switch and air passes to a cylinder which lifts the shuttle carriage vertically at the commencement of a cycle. The shuttle, when lifted to receive a steel sheet or pressing, actuates a roller valve which causes the second cylinder to move the shuttle carriage forward horizontally to the press orifice and load the pressing or sheet on to the die. At this point the rotary cam switch again operates de-energizing the solenoid valve. This causes the shuttle raising cylinder to retract and lower the shuttle. At the end of this stroke the second roller valve is actuated causing the shuttle carriage cylinder to retract and return the carriage horizontally to its original position. This completes one cycle. The press then forms a pressing and at a pre-determined point the rotary switch operates and energizes the solenoid valve which starts a second loading cycle.

Pre-bending Machines

The use of portable pre-bending and loading machines has greatly assisted production and removed complicated die operations.

In the production of a pressing, such as a car facia panel which has a 'U' section, the sheet has to be first bent to the appropriate shape before being fed into the press, to prevent cracks and drew lines appearing in the metal as a result of the pressure. This problem has been successfully solved by the pre-bend loader which uses Maxam cylinders and valves. An example of one type of pre-bend machine in use is described below.

A steel sheet is fed by hand on to the loader platform and passes, in synchronization with the press stroke, between two sets of lateral roller bars. Depending on the shape required and the amount of angle or curve to be given to the steel sheet the bars are correctly positioned and the distance the top bars descend is appropriately adjusted. At a selected point the top roller bar descends on to the steel sheet by means of air cylinders and forces the sheet between the two lower bars. If a flat overlap is required two additional top bars descend which level off the protruding metal each side of the bent section. The formed sheet is then lifted by air cylinders and a small air cylinder controlled clamp grips the metal. When the press reaches the end of its stroke and the dies are apart the clamp and carriage move the shaped steel sheet into the press. The sheet is placed in position on the lower die and the carriage then returns to start a second operation.

The loader platform carries three steel sheets at a time and the operation is continuous with the operation of the press. The air cylinders which actuate the platform, roller bending bars and jaw unit are controlled by Maxam valves and bleed reservoir units. The complete machine is controlled by the rotary cam micro-switch in the press which actuates a Maxam solenoid valve allowing air to pass in correct sequence to the various cylinders and valves, etc.

Turnover Machines

The production of a complicated pressing often requires that the pressing has to be formed from both sides. Thus, at some stage or stages in production the pressing must be turned over before it is fed into the next press.

To replace former manual turnover operation a portable turnover machine has been developed which can turn over pressings of many sizes and feed them directly into the next press. This machine contains Maxam cylinders and valves and comprises a wheeled-base trolley which has a vee-shaped slide in the direction of travel between presses. A normal jaw-type extractor extracts a pressing and places it at the top of the slide nearest the press. The pressing moves down the slide and in its resting position is standing vertically on its edge. A cylinder piston then pushes the pressing over 'top' downwards on the opposed slide and other air cylinders operate and push the pressing up this slide and into the next press. This operation is continuous with the operation of the press and is controlled in the usual manner by the rotary cam multi-switch on the press actuating a Maxam solenoid valve. Timing reservoirs control the operating sequence and timing of the separate movements of the cylinders and valves, etc., and the 'start' and 'stop' sequence is controlled by the rotary cam switch.

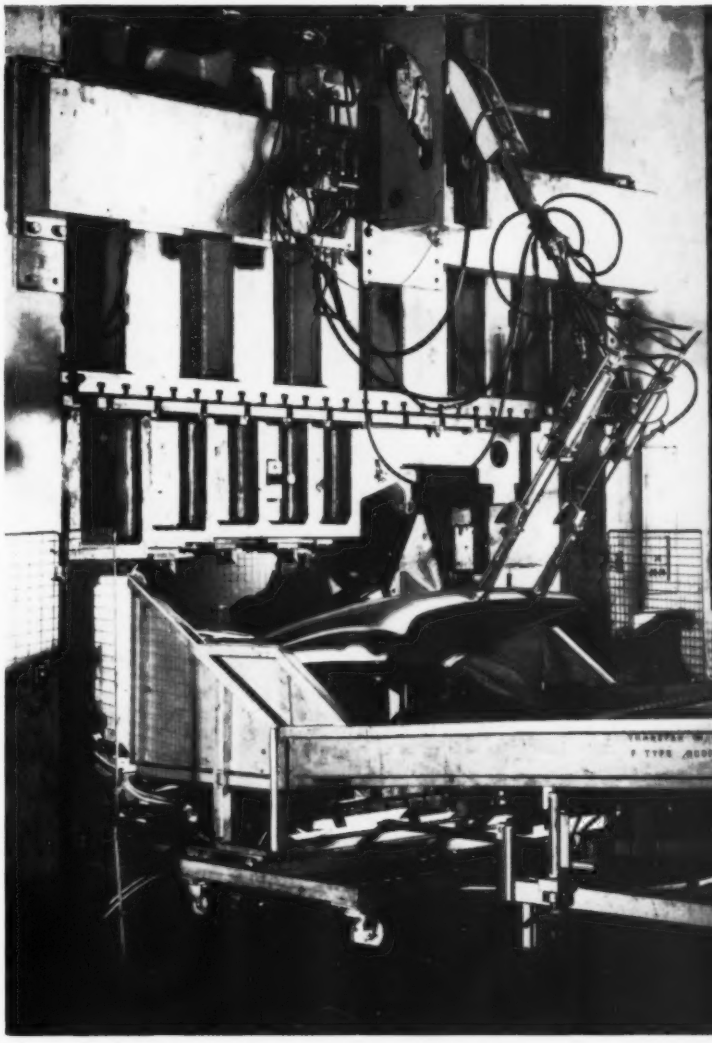


Fig. 5. Shown in this photograph, is a twin jaw extractor removing a car roof pressing from the die of the press and placing it on an inter-press transfer station. The two jaws which grip the pressing are operated by Maxam air cylinders which can be seen mounted behind the jaw assembly

THE USE OF MAGNETS FOR MATERIALS HANDLING

By L. J. Hoefkens, A.Inst.Prod.E.*

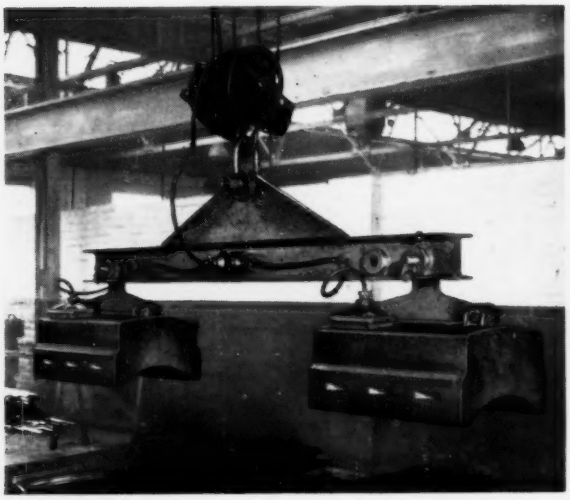


Fig. 1. Two electro-magnets with special curved faces suitable for handling bar stock

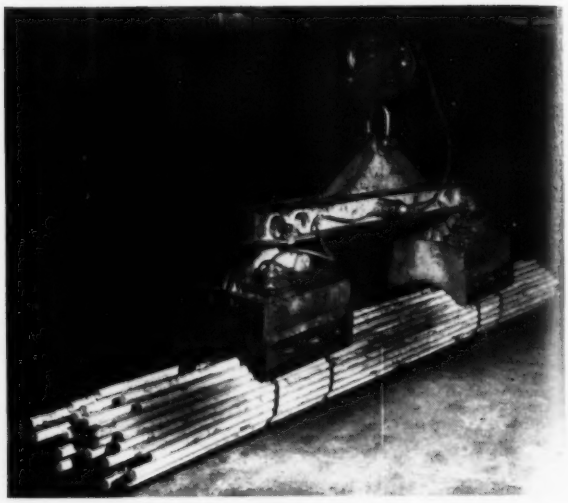


Fig. 2. Handling bar stock

It would appear from the few applications of electro-magnets that one finds in factories that their extreme usefulness and efficiency as a material handling device is not fully appreciated or realized.

Electro-magnets having no moving parts require very little maintenance and rarely fail in operation, neither do they require much power for their operation and such as is needed is only required during the actual lifting or transporting of materials.

It is, however, necessary to understand something of the capabilities and limitations of electro-magnets so that a correct application for their employment may be selected. Firstly, the manufacturer of the magnet will require to know the type of material which it is intended to lift and transport and also the maximum weight of the loads envisaged. In some applications for instance, more than one magnet may be needed and they may be suspended from a spreader bar, so that these additional weights have to be added to the maximum load in order to be sure the lifting-crane or hoist has the requisite capacity.

An electro-magnet is energized by passing through the windings of its coils a direct current usually derived from the mains supply via a rectifier. This current in turn creates a powerful magnetic field below the pole faces of the magnets. It should be borne in mind that whilst this magnetic field is very powerful and capable of holding the load it is designed to carry nevertheless the depth of the magnetic field may only be a few inches, after which its power rapidly falls off. In practice this means that the most satisfactory types of loads are either those which consist of a solid mass of metal or else one made up of a number of pieces of metal the majority of which are able to be in physical contact with the surface of the magnets. For example, a solid sphere of metal although making only 'one-point' contact has sufficient mass of metal within the magnetic field to support a considerable load. On the other hand, a thin rod of metal, say, $\frac{1}{4}$ in dia although in contact with the magnet for part of its length, can easily be detached by hand because the mass of metal within the field is very small.

The same kind of limitations apply with loose irregular shaped articles such as castings, pieces of odd scrap, etc. A magnet will only pick up a very limited quantity, nowhere approaching its full lifting capacity. The end articles will be very loosely attached and will probably fall off when the load is moved. They are progressively held with greater firmness as they get nearer to the magnet. By comparison with this, bars of, say, 2 in dia, a billet of tool steel or a sheet of heavy gauge metal will be very firmly held and the full carrying capacity of the magnet can then be utilized. In the case of such commodities as bar stock or tubing, the full capacity can be lifted and transported if the load is bonded with steel strapping, wire or cord, etc. Provided always, of course, that an adequate mass of metal is in contact with the magnet faces or with the magnetic field. To achieve this objective when handling bar stock, magnets with special curved faces have been designed so that as large a number as possible of bars is in contact with the magnet and are

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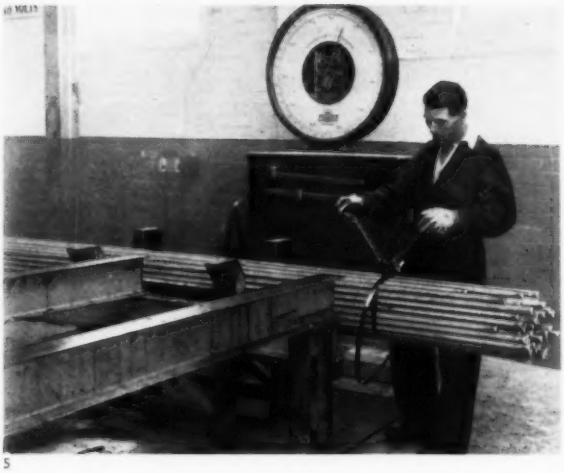

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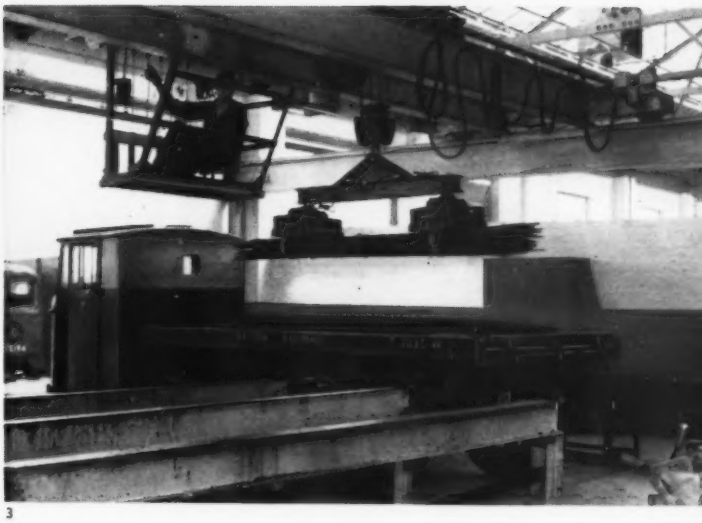
Fig. 3. A railway lorry bring unloaded. Magnets lifting off a bundle of steel bars

Fig. 4. End grinding of bars before bundling for stock. Bars roll off table into cradle mounted on weighing machine

Fig. 5. Bars being bundled with steel strapping after end grinding operation

embraced by the magnetic field. (See Fig. 1.) If the same bundle of bars is placed on the ground and the binding is cut and then the magnet applied, only part of the quantity will be picked up. The bars will assume the shape of a bunch of grapes, the lower bars being very insecure.

Having selected a suitable application for the use of an electro-magnet as a materials handling device one will probably be very worried about its safe employment within a works. What will happen if a fuse blows or there is a power cut? This is a very genuine apprehension and one which no doubt deters many from using magnets. However, the remedy is very simple and extremely efficient and will be approved by those responsible for safety. A battery or several batteries can be mounted on the crane bridge or platform and their output connected across the magnets, the power of the batteries being such that with them alone the magnet will sustain the maximum load for a period of, say, 20 min. A battery charger is permanently connected between the mains supply and the batteries and provided with a device for automatic charging, i.e., it commences to charge when the batteries reach a predetermined condition of discharge and cuts itself off when charging is completed. During this period whilst the batteries are supporting the load the fuse can be replaced or if a power cut then the load can be lowered to the ground by means of a special brake on the crane winding drum. Therefore, provided the right type



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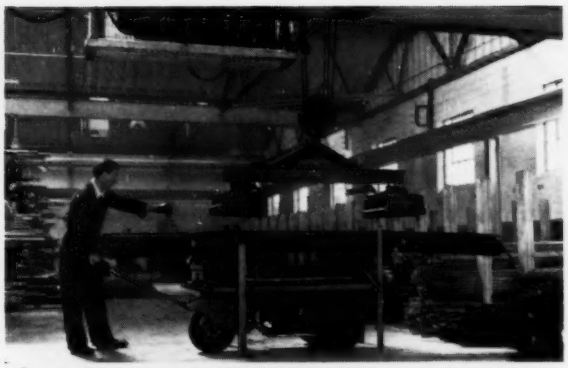
of load is being handled there is no danger whatsoever of a load falling off the magnets and causing injury to personnel or property.

An excellent and efficient application is the handling of bar stock by means of an electro-magnet. (See Fig. 2.) A successful case history will now be described of such an application. It demonstrates its usefulness immediately upon arrival of the material into the store, namely in the rapid and safe unloading of road vehicles with the minimum of labour.

When a lorry arrives with a load of steel bar it is not an uncommon sight to see several men with long levers or crow-bars prising up the bundles, so that a sling or chain can be passed underneath. This labour force is in addition to the crane driver. Then when finally the bundle is ready for lifting, it is raised a short distance to test it for balance. Frequently it will be found to be out of balance and to have a dangerous lurch, the source of danger being the possibility of the greasy bars slipping in the sling. It is, therefore, lowered again and the chain adjusted. This procedure is repeated until the slinger is satisfied that the load is safe to travel. Increased difficulties are experienced where the binding of strapping has broken en route and the load arrives in a loose condition. An awkward situation also arises when the load to be delivered is a small one and is surrounded by material for other destinations. In this case much prising, levering and heaving is frequently required before the slings are in position. These sort of problems are overcome and the work of unloading bundles of bar is simplified by using

Fig. 6. 1 ton of bar being placed into stock by crane and electro-magnets



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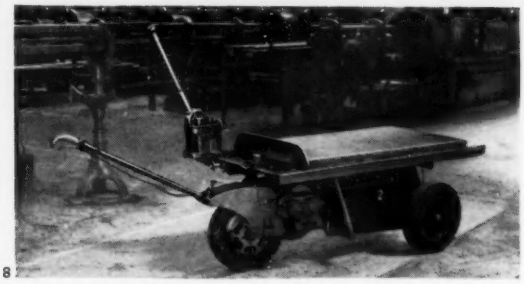

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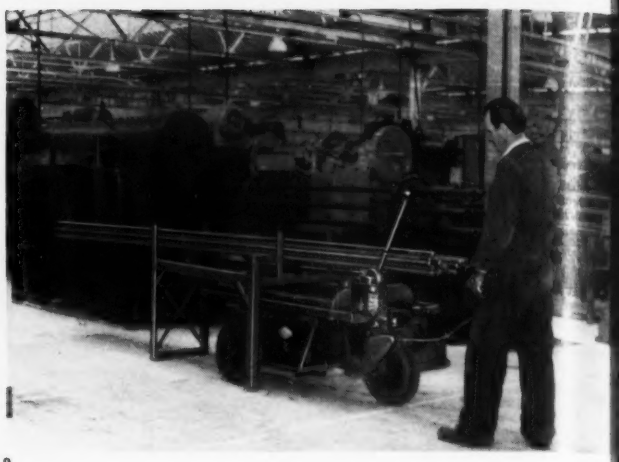

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Fig. 7. An issue being made to the automatic shop. Each machine has its own stand

Fig. 8. Electric truck with elevating platform used to transport stand with unit load of bar to automatic shop

Fig. 9. Delivery being made to an automatic machine. Full stand is left at machine and empty stand removed. Bar is not handled

the correct type of magnet and one man only (Fig. 3). Even if the load when raised is found to be slightly off balance it will not slide so that it can be transported although not absolutely horizontal. A centre load on a lorry or a loose load can equally well be handled except that several lifts may have to be made in cases where the banding has been broken or omitted. Subsequent handling operations after unloading are also made more efficient, cleaner and safer. A typical sequence of operations is as follows and applies particularly when the bars are ultimately used in automatic machines.

The load is then deposited in an abeyance area to await inspection or laboratory checks or until it is required at the next stage. When required, the crane and magnet pick up a bundle of bar from the abeyance area and deposit it on the end of a steel table, the top of which consists of three steel sections. The ropes or wires holding the bundle are cut and the bars spread themselves out; on either side of the table are situated two pointing machines arranged in pairs. Each pair can take a range of diameters of bar. The operator on the left takes a bar, points it and pushes it across the table to the operator on the right, who points the other end and then rolls the bar into a wooden cradle which rests on the sunken platform of a weighing machine. The weight of the wooden cradle is permanently offset on the weighing-machine dial so that a direct visual reading of the weight is obtained (Fig. 4).

The operators roll into the wooden cradle sufficient bars to make up a standard load, which is governed by the type of material and rate of usage by the machine shop. Usually it will be about 1 ton of steel bars and 5 or 10 cwt of dural bars. A bundle of these weights will have a diameter of about 12 in and the wooden stand has its two end rests shaped in a semi-circle of this diameter, thus assisting the formation of a compact bundle. The operator, by watching the weighing-machine dial, stops loading the cradle at the bar nearest to the predetermined weight.

Both operators then proceed to strap the bundle with steel strapping (Fig. 5). Where the bundle consists of non-ferrous bar, a length of steel bar about 18 in long and not less than $\frac{1}{2}$ in dia is laid under each strapping. Scrap ends can be used for this purpose. This simple expedient enables all types of bar to be handled magnetically. To each bundle is affixed a small tag bearing the specification, size and weight of the bundle. The tag is covered by a piece of transparent adhesive tape to prevent the writing being defaced or erased by oil or grease. Where a weighbridge for checking incoming vehicles is not available the weight of delivery can be verified at this stage.

The crane and magnet then lift the bundle out of the cradle (which, being wooden, is non-magnetic), carry it down the store and deposit it in one of a series of stalls formed by steel girders sunk into the floor at appropriate intervals. Each stall will hold between 10 and 14 tons of material; in any one stall only material of the same specification and size is stored (Fig. 6).

The material is now ready for immediate issue when it is required on a machine. Pointing has been done and the weight of the issue which is required for stock record purposes has already been determined. The crane and magnet pick the top bundle out of the stall containing the specification and size called for and deposit it on a special angle-iron stand (Fig. 7). A small pedestrian-controlled Graiseley electric truck is placed under the stand (Fig. 8).

The operator goes to the control point in the store, clips the steel banding with snips and deposits the banding in a receptable which, when full, is taken to the scrap house. The tag is removed and placed in a box for collection by the stock record section, and if the material is non-ferrous the two small lengths of steel bar are removed and placed in a container for further use. The operator takes the consignment to the machine, which by this time should be nearly exhausted of material, removes any remaining bars from the stand by the machine and places them on top of the bars he is now delivering. The empty stand is then removed into the main gangway and the full stand positioned adjacent to the machine. The hydraulic jack is released and the table of the truck lowers, thereby releasing the full stand which is left by the machine, the storeman returning with the empty stand. One man can deliver in this way a maximum of 1 ton of material in less time than previously $\frac{1}{2}$ ton was delivered by two men (Fig. 9).

Stock-auditing of bar stored in this way is simplicity itself, no handling having to be performed. All that is required is to list the weights and details on the tags attached to the strapped bundles.

J. M. BESKINE, B.Sc.(Eng.)

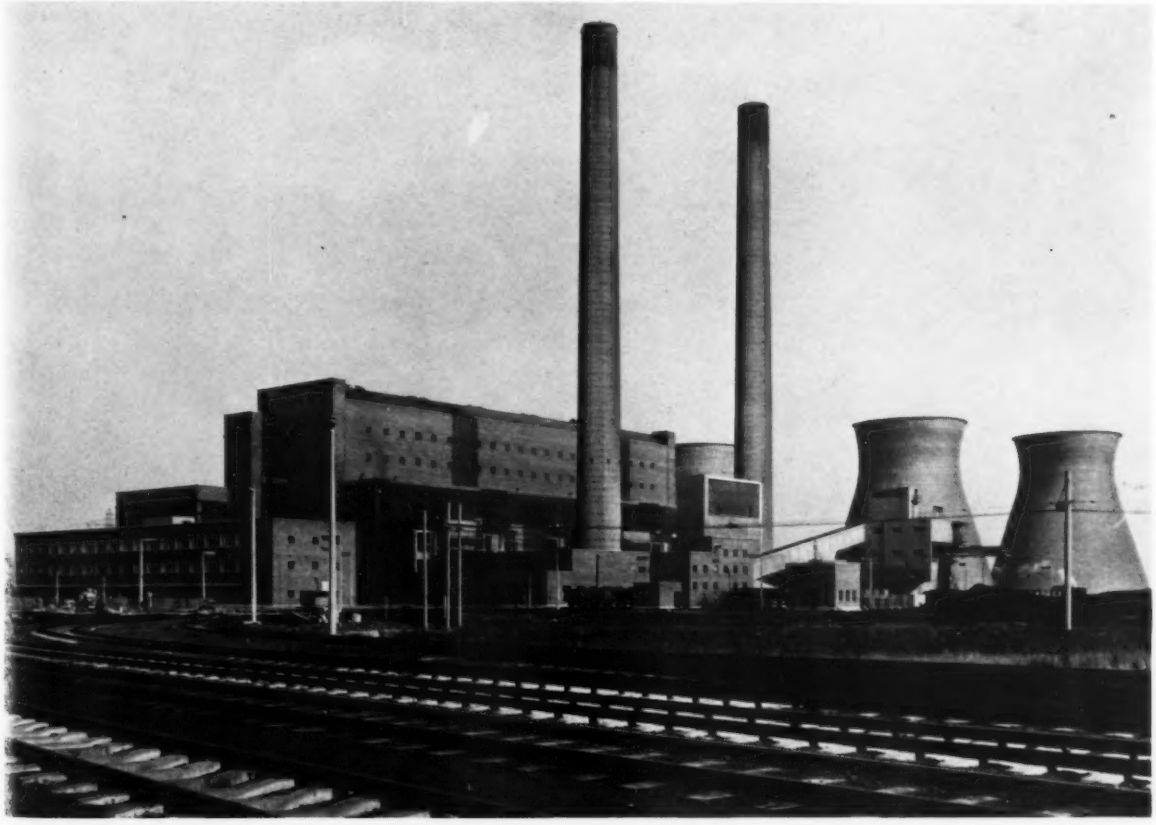
MATERIALS HANDLING AT A MODERN INLAND POWER STATION

PART ONE: HANDLING OF RAIL-BORNE COAL SUPPLIES

THROUGHOUT BRITAIN there now are quite a few recently built major power stations which are sited inland and entirely away from sea, river or canal water transportation facilities suitable for cheap and rapid delivery of bulk coal supplies throughout the year. Of necessity, rail-borne coal supplies have to be employed for these inland power stations, use being made of rail wagon tipplers and similar wagon-unloading plant. As a rule, drag scrapers or transporters are employed for stocking out and reclaiming of coal, this being more or less general throughout riverside and coastal power stations as well as inland power stations. The Central Electricity Generating Board, owners and operators of Britain's electricity generating stations, are also understood to be interested in the use of mobile rubber-tyred earth-moving equipment such as scrapers and tractors for coal stock control.

Recently commissioned inland power stations which depend entirely upon railway deliveries for their coal supplies are well exemplified by the new Goldington Power Station (Fig. 1), which is sited about three miles from the centre of Bedford (Fig. 2), some 50 miles north of London. Bedfordshire was one of the new industrial areas largely 'opened-up' as a result of war-time developments and the post-war boom. By 1945 it was clear that an additional electricity generating station would soon be required in or near Bedford itself. Prior to nationalization of electricity generation and supply, the local electricity supply authority, Bedford Corporation, in conjunction with the then existing

Fig. 1. Goldington Power Station, general view looking north-east, showing handsome external appearance of the station as a whole



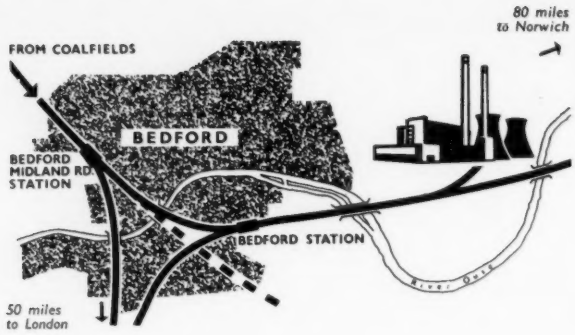


Fig. 2. Inland location of Goldington Power Station

Central Electricity Board, began a search for a suitable site. Whilst investigations were in progress, nationalization took place, and responsibility passed to the Eastern Division of the Central Electricity Authority, now the Central Electricity Generating Board.

The site at Goldington was selected towards the end of 1948 for a number of reasons, amongst them the following, (*a*) its good load-carrying properties due to existence of gravel close to the surface, (*b*) proximity of the Bedford-Cambridge branch of British Railways, for delivery of coal supplies, (*c*) availability of cooling water from the nearby River Ouse, as shown in Fig. 2.

Conventional Power Station Handling Problems

In the operation of a conventional thermal power station, there are five main groups of materials to be handled: (*a*) fuel (coal and oil); (*b*) ash; (*c*) circulating cooling water and make-up water for the boilers; (*d*) miscellaneous stores including water-softening chemicals and lubrciating oil; (*e*) plant and equipment for repair work and maintenance, such as electric motors, fans, etc.

At Goldington Power Station a small amount of oil fuel is used for starting up the boilers. These are pulverized fuel boilers and they have been fitted with oil-burning equipment as well as pulverized coal equipment. In all, there are six generating sets, each of 30,000 kW capacity. Each generating set is driven by its own steam turbine in the usual manner, each turbine being supplied with steam from its own boiler. There is no interconnection between boilers on the steam side or the feed water side, each boiler and turbine being designed to operate as a separate self-contained unit.

The first of the station's boiler-turbine-generator units

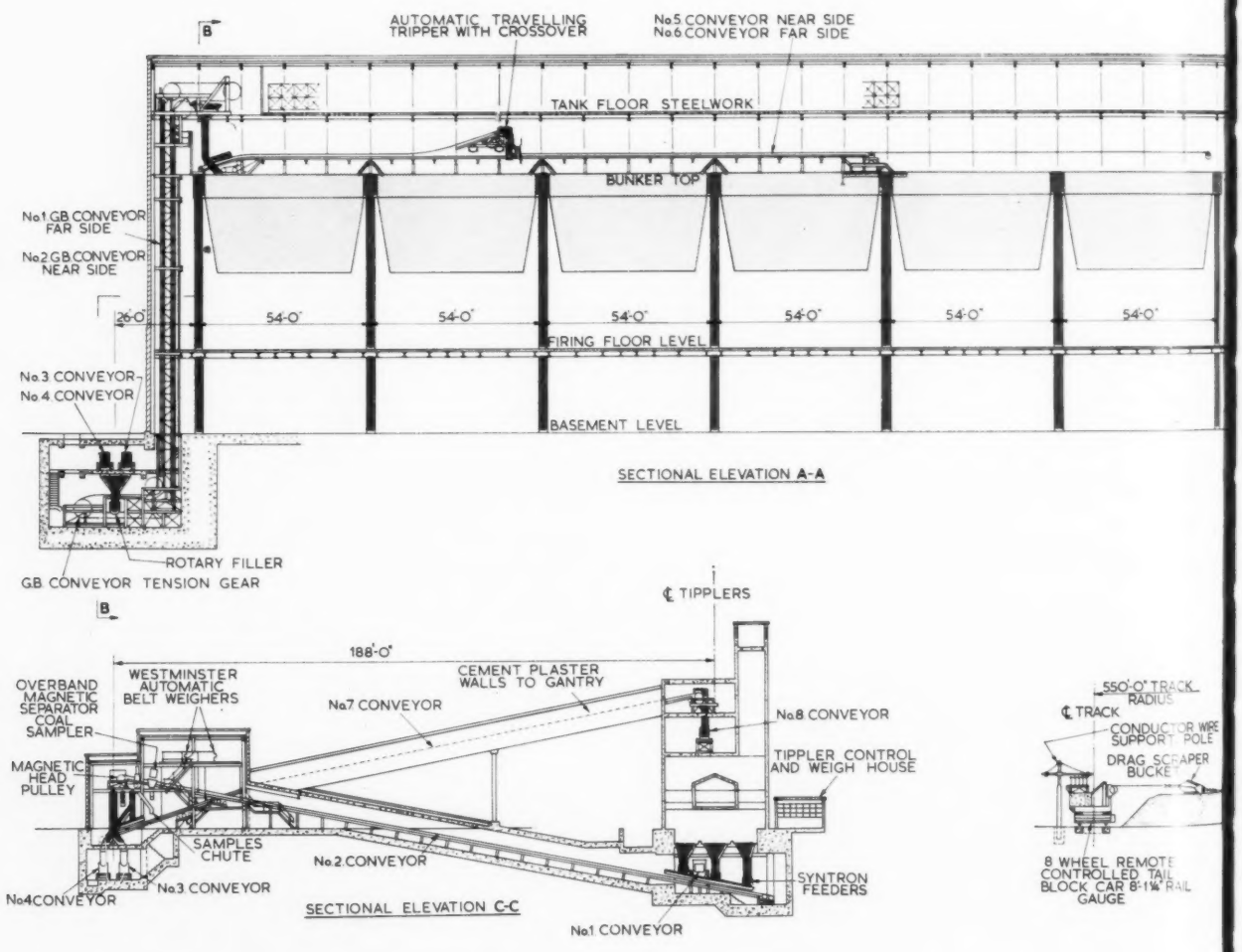
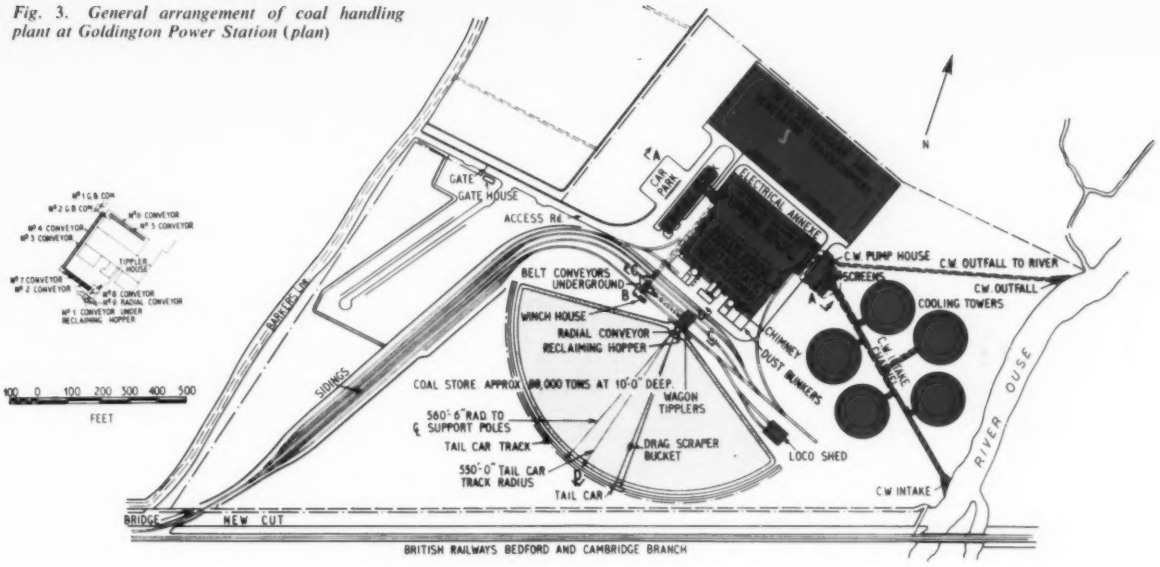
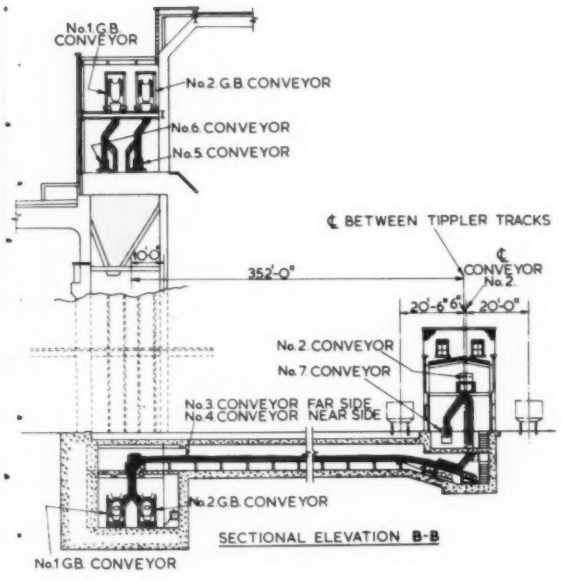
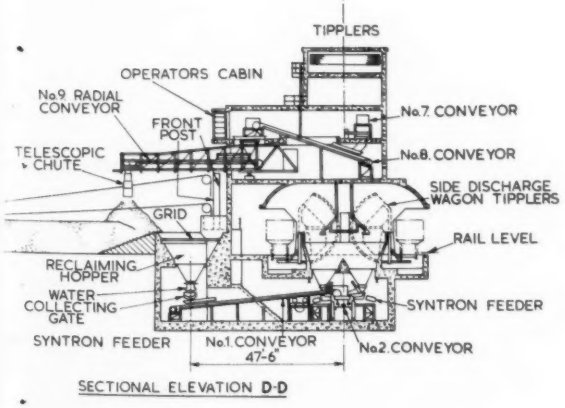


Fig. 4. General arrangement of coal handling plant at Goldington Power Station (elevations)

Fig. 3. General arrangement of coal handling plant at Goldington Power Station (plan)







was commissioned in June, 1955, five years after consent of the Minister of Fuel and Power for installation of generating plant. Preliminary site works commenced in 1951 and construction in May, 1952. The other five generators, boilers, etc., were installed at intervals, ending with the sixth generating set and boiler in April, 1958.

Each boiler has a full load coal consumption of 18 tons/hr, making 108 tons/hr for the six boilers, which corresponds to a maximum weekly coal consumption of 18,144 tons for full load for 24 hours per day, seven days per week.

Actually, throughout the winter of 1958-59, and during the early spring of 1959, Goldington Power Station has been operating at full load for 18 hours per day, approximately, for seven days per week. The corresponding coal consumption at 18 tons/hr per boiler comes to 12,000 tons.

In fact, coal consumption has varied from about 9,120 tons per week, to about 11,000 tons per week.

The general coal handling problem, essentially, is to ensure that coal stocks are maintained sufficient to enable the power station to continue in operation for several weeks at a time, should coal deliveries temporarily cease, and to enable rapid delivery of coal to be made via the railway from the collieries, to the boilerhouse bunkers or stockpile, according to requirements. Organizationally, the problem is to progress railway deliveries and do all that can be done to expedite them so that as far as possible the station is mainly consuming each day's coal delivery on the day of arrival. Economically, the problem is to make best use of mechanization and to work with a team of men which are in every way sufficient for the purpose, but which are not handicapped by large numbers of 'passengers'.

The ash handling problem is a parallel one: to dispose of the ash fast enough to ensure that efficient boiler operation is maintained. And, in both ash handling and coal handling, supplementary problems are those of ensuring that minimum dust nuisance is created during handling and transporation, both within the power station premises and outside them.

Actually, ash handling in an inland power station consists of elements such as collection of boiler ash, which have been long studied and which can be brought under very good control, together with elements which may sometimes offer difficulties, such as fine gas cleansing and disposal of ash, particularly that from pulverized fuel boilers, and dust-free

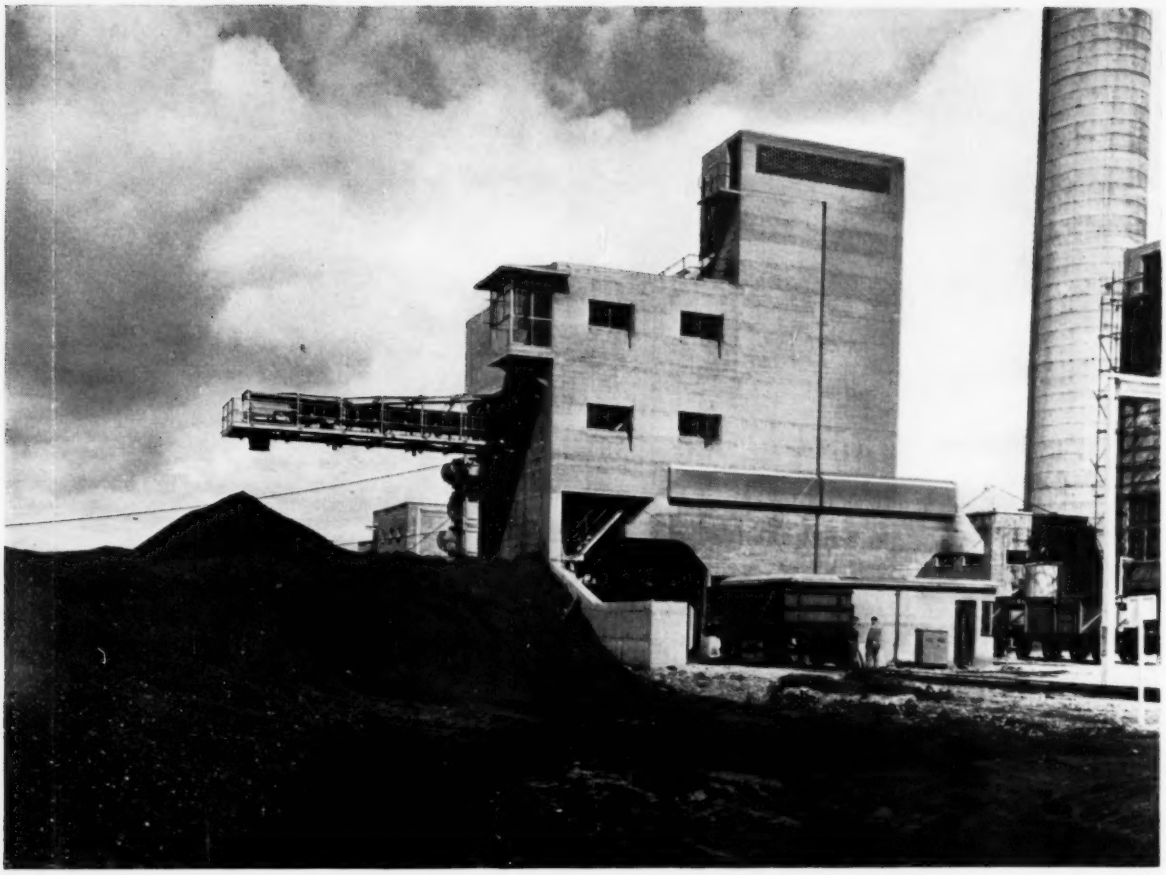


Fig. 6. Combined tippler house and stocking-out conveyor tower, showing boom-type stocking-out conveyor and part of coal stock, drag scraper control room within enclosed glass-walled cabin at second floor level, and inner wagon tippler railway track (No. 2 tippler track)

Fig. 5. General view of combined tippler house and stocking-out conveyor tower (left) and combined junction house, automatic weighbridge house and sampling house (right), with coal wagons in foreground

transportation to and along main public highways. At Goldington Power Station a very interesting hydraulic ash and dust handling plant has been installed, and lorries remove this material, some of it being sold to local contractors. The amount of ash and dust removed per week varies with the type of coal burned, particularly its ash content, as determined by laboratory tests on samples. Generally a coal of about 12½ per cent ash content is used and the quantity of ash and dust removed per week is, at present, about 3,000 cu. yd.

The report which follows deals mainly with coal handling. Ash and dust handling will be dealt with subsequently. Cooling water and make-up water is pumped in the usual way and will not be discussed in the report. The new power station is particularly well supplied with modern safe-to-work-on handling facilities for general materials handling and for dismantling and erection of plant and equipment.

	Operation	Cap. t.p.h.	Conveyors								Chut spit 'D'
			9		8		7		6		
1	Tipplers to Store	250	S	NR	S	NR	S	NR			
2		250	S	NR	S	NR	S	NR			
3		250	S	NR	S	NR	S	NR			
4		250	S	NR	S	NR	S	NR			
5	Tipplers to Bunkers	250							S	NR	C(
6		250							S	NR	C6
7		250		M		M		M	S	NR	C6
8	Store to Bunkers	250							S	NR	C6
9	Store to Bunkers	125							S	NR	C(
10		125							S	NR	C(
11		125									
12		125									
13		125		M		M		M	S	NR	C6
14		125							S	NR	C6
15		125									
16		125									
17	Tipplers to Bunkers	125							S	NR	C6
18		125							S	NR	C6
19		125							S	NR	C6
20		125							S	NR	C6
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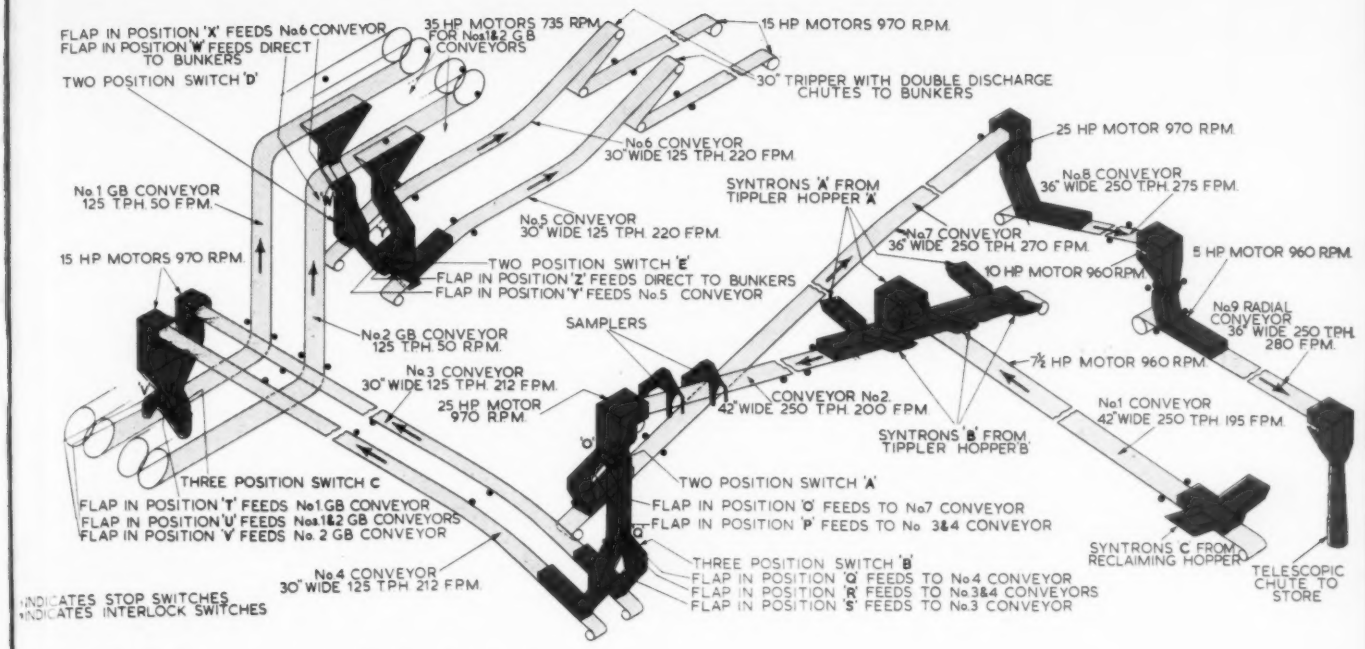

Fig. 7. Isometric arrangement of coal handling plant showing electrics

KEY

S	Sequence test switch on sequence
NR	Changeover switch on normal running
I	Changeover switch on isolate-conveyor
C	Conveyor
M	Maintenance
T1	Operate tippler 1
T2	Operate tippler 2
DS	Operate drag scraper

INSTRUCTIONS FOR RUNNING COAL PLANT

1. Select from chart operation required.
2. Reading chart from left to right operate switches as shown.
3. At each starter, the following sequence should be observed assuming that the isolators on the various main switchboards are closed.
   - (*a*) Close isolating handle at side of starter.
   - (*b*) Check sequence/test switch is on starter.
   - (*c*) Turn changeover switch to position indicated on chart.
   - (*d*) Push start button.

   Proceed to next starter or chute switch as indicated on the chart.
4. Close isolators on syntron feeders required and set feed indicators to point corresponding to required feed rate. No. 1 syntron feeders start automatically with No. 1 conveyor. Tippler operator starts two or three vibratory feeders as required.
5. If conveyor fails to operate and you have checked that all your switches are in the correct positions, do not run conveyors with sequence/test switch in 'test' position before application is made to a responsible person.
6. Check that sampling equipment starters are set for operation.

Chut syit 'D'		nveyors 5	Chute switch 'E'	Conveyors G.B.1		G.B.2		Chute switch 'C'	Conveyors 4		3		Chute switch 'B'	Chute switch 'A'	Conveyors 2		1		Syntrons 1	2	3	Tipplers 1	2	Drag scraper
														C7	S	NR				S.NR		T.1		
														C7	S	NR					S.NR		T2	
												M		C7	S	I3C				S.NR		T1		
										M				C7	S	I4C				S.NR		T1		
NR	C6		NR	C5	S	NR	S	NR	GB1 & 2	S	NR	S	NR	C3 & 4	C3 & 4	S	NR			S.NR		T1		
NR	C6	,	NR	C5	S	NR	S	NR	GB1 & 2	S	NR	S	NR	C3 & 4	C3 & 4	S	NR				S.NR		T2	
NR	C6	S	NR	C5	S	NR	S	NR	GB1 & 2	S	NR	S	NR	C3 & 4	C3 & 4	S	I7C			S.NR		T1		
NR	C6	'	NR	C5	S	NR	S	NR	GB1 & 2	S	NR	S	NR	C3 & 4	C3 & 4	S	NR	S	NR	Auto					DS
NR	C6				S	NR			GB1	S	NR			C4	C3 & 4	S	NR	S	NR	Auto					DS
NR	C6				S	NR			GB1			S	NR	C3	C3 & 4	S	NR	S	NR	Auto					DS
			NR	C5			S	NR	GB2	S	NR			C4	C3 & 4	S	NR	S	NR	Auto					DS
		,	NR	C5			S	NR	GB2			S	NR	C3	C3 & 4	S	NR	S	NR	Auto					DS
NR	C6				S	NR		M	GB1	S	IGB2			C4	C3 & 4	S	I7C	S	NR	Auto					DS
NR	C6				S	NR		M	GB1	S	IGB2		M	C4	C3 & 4	S	I3C	S	NR	Auto					DS
		,	NR	C5		M	S	NR	GB2		M	S	IGB1	C3	C3 & 4	S	I4C	S	NR	Auto					DS
			NR	C5		M	S	NR	GB2	S	IGB1		M	C4	C3 & 4	S	I3C	S	NR	Auto					DS
NR	C6				S	NR			GB1	S	NR			C4	C3 & 4	S	NR				S.NR		T1		
NR	C6				S	NR			GB1			S	NR	C3	C3 & 4	S	NR				S.NR		T1		
NR	C6				S	NR			GB1	S	NR			C4	C3 & 4	S	NR					S.NR		T2	
NR	C6				S	NR			GB1			S	NR	C3	C3 & 4	S	NR					S.NR		T2	
			NR	C5			S	NR	GB2	S	NR			C4	C3 & 4	S	NR				S.NR		T1		
		,	NR	C5			S	NR	GB2			S	NR	C3	C3 & 4	S	NR				S.NR		T1		
		S	NR	C5			S	NR	GB2	S	NR			C4	C3 & 4	S	NR					S.NR		T2	
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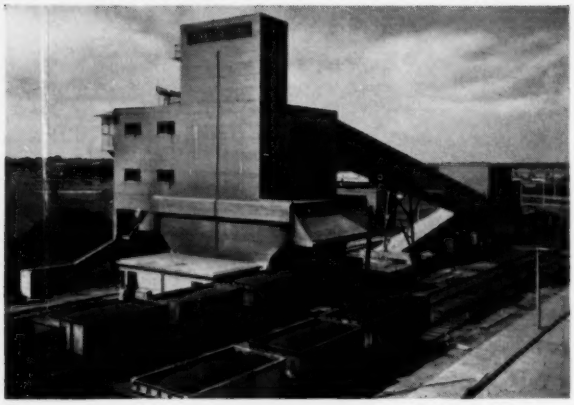

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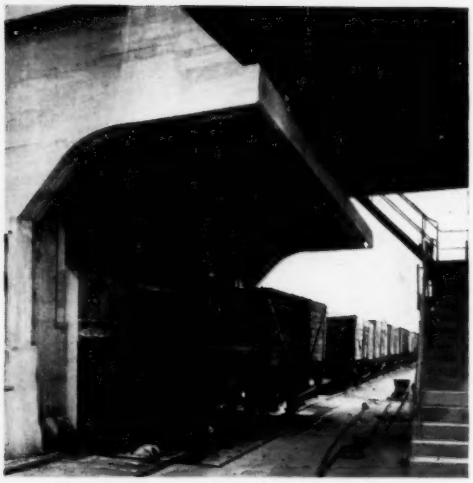

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Fig. 10. Diagramatic representation of mode of operation of a Strachan & Henshaw dust trapping system, as used with Strachan & Henshaw 'Rotaside' tipplers

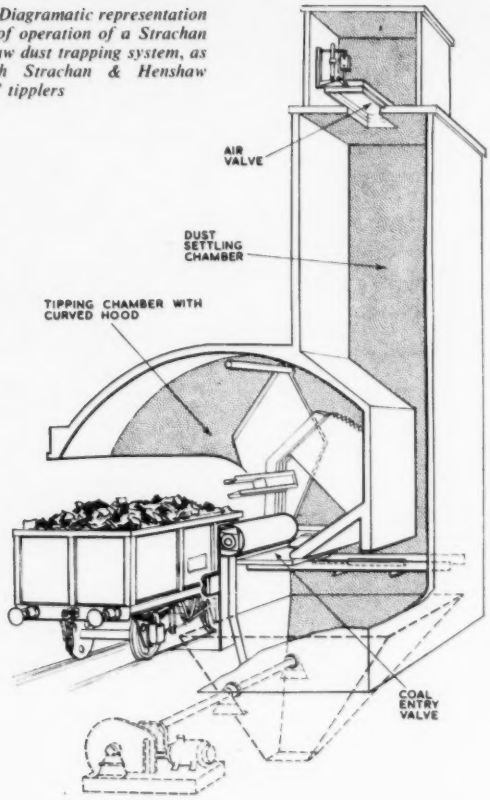


Fig. 8. General view of combined tippler house and stocking-out conveyor tower, showing railway siding in foreground and a wagon about to be discharged by the front tippler (No. 1)

Fig. 9 (left). View of No. 2 tippler, showing curved hood

These facilities will also be described subsequently. The purpose of the three reports is to draw attention to present-day material handling standards in the electricity generating industry and to show that as a design principle improved materials handling methods can be fully integrated with all aspects of design as well as operational economics.

Aesthetic Objection to Overhead Conveyor Gantries

Goldington is a residential suburb of Bedford, and although the actual power station site is about half a mile or so from the present boundary of the built-up area, for practical purposes the power station was considered by its designers to be in effect in an urban non-manufacturing area. It was therefore decided that the new power station should be as aesthetically non-irritating as possible under the circumstances. For this reason special attention was paid to its outward appearance, brick-coloured concrete being used for the cooling towers, the chimneys, the conveyor gantries and coal-handling plant, and for the power station structure generally.

A special effort was made to minimize the requirements for external overhead conveyor gantries between the railway sidings and the coal stockyard and the boilerhouse. For this reason, as can be seen from Figs. 1, 4 and 7, there is a minimum of overhead conveyor gantries in the silhouette of the power station. As can be seen from Figs. 4 and 7, conveyors between coal sidings and boilerhouse which would probably otherwise have been carried on overhead gantries are, in this station, taken through underground tunnels, gravity bucket elevators being used to raise the coal to boilerhouse bunker level. This general conveyor layout was used for identical reasons at a number of previously commissioned power stations, e.g. Rye House, Croydon B, and Edinburgh.

Coal-dust Emission Control at Goldington

Dust emission at a coal-burning thermal power station can be due to three separate sources, (*a*) coal dust from the sidings, stockpiles, handling equipment and bunkers, (*b*) chimney fumes, and (*c*) boiler dust, ash and grit waste materials, during collection and removal from the site. It can also be due to leakage from boiler plant proper. The problem of coal-dust emission control only is discussed in what follows. An interesting modern hydraulic ash and dust-handling plant is installed at Goldington power station, and this will be described in a future report dealing with the handling of ash and dust from pulverized-fuel boilers.

Goldington Power Station is considered to be amongst the cleanest of the coal-burning stations operated by the Central Electricity Generating Board. Within the boiler-house, certainly, there is little or no coal-dust emission. Outside, too, there is little evidence of coal-dust nuisance, except in parts of the coal sidings during dry weather. In comparison with other coal-burning stations, even the sidings are relatively clean, although certain parts of the handling plant, such as the scraper control tower, seem to be

suffering from somewhat greater coal-dust nuisance than might have been expected, even in dry weather and with a fair wind blowing across the stockpile.

Two main modes of attacking the coal-dust nuisance problem were employed at Goldington, (*a*) the wagon tipplers were fitted with a special dust-trapping system, and (*b*) attention was given to coal-dust leakage from conveying plant, by using tightly sealed change of direction points. Both methods have helped to reduce coal-dust emission. The problem is by no means completely solved, but it has been attacked with a measure of success.

The Strachan & Henshaw Dust-trapping System

International Combustion Products, Ltd., were the main contractors for the Goldington Power Station coal stocking, conveying and wagon discharging plant, the general arrangement of which is shown in Figs. 3, 4 and 7. This plant incorporates a pair of Strachan & Henshaw 'Rotaside' tipplers (Fig. 9), each being fitted with a Strachan & Henshaw patented dust-trapping system (Fig. 10).

It will be appreciated that when coal wagons are being discharged by tipping into hoppers, the air displaced from each hopper tends to set up a turbulent zone rich in suspended coal dust, and dispersal of this by the general external air movement is the way in which fine coal-dust emissions travel from the sidings to the surrounding area. The Strachan & Henshaw dust-trapping system is designed to control this kind of dust emission. It is based upon three main principles: (*a*) sealing-off each coal wagon and its contents from the outer air during discharge operations; (*b*) provision of a large and lofty top-vented dust-settling chamber, with an entry valve and an air valve which is normally sealed off from the outer air; and (*c*) automatic operation of both valves, which open and close simultaneously at appropriate times when actuated by the tippler.

The actual arrangement is as indicated in the diagram (Fig. 10). Protection of the coal from the wind, as it falls from the wagon, is obtained by the curved hood or cowl, which projects over the tippler cradle. The cradle is plated continuously from end to end, and after a rotation of 45 deg the tippler plating provides an all-round seal within the cowl, allowing for working clearances. The wagon is then virtually inside a closed chamber, termed the tipping chamber.

Fig. 12. General view of the boom-type stocking-out conveyor (No. 9 conveyor)

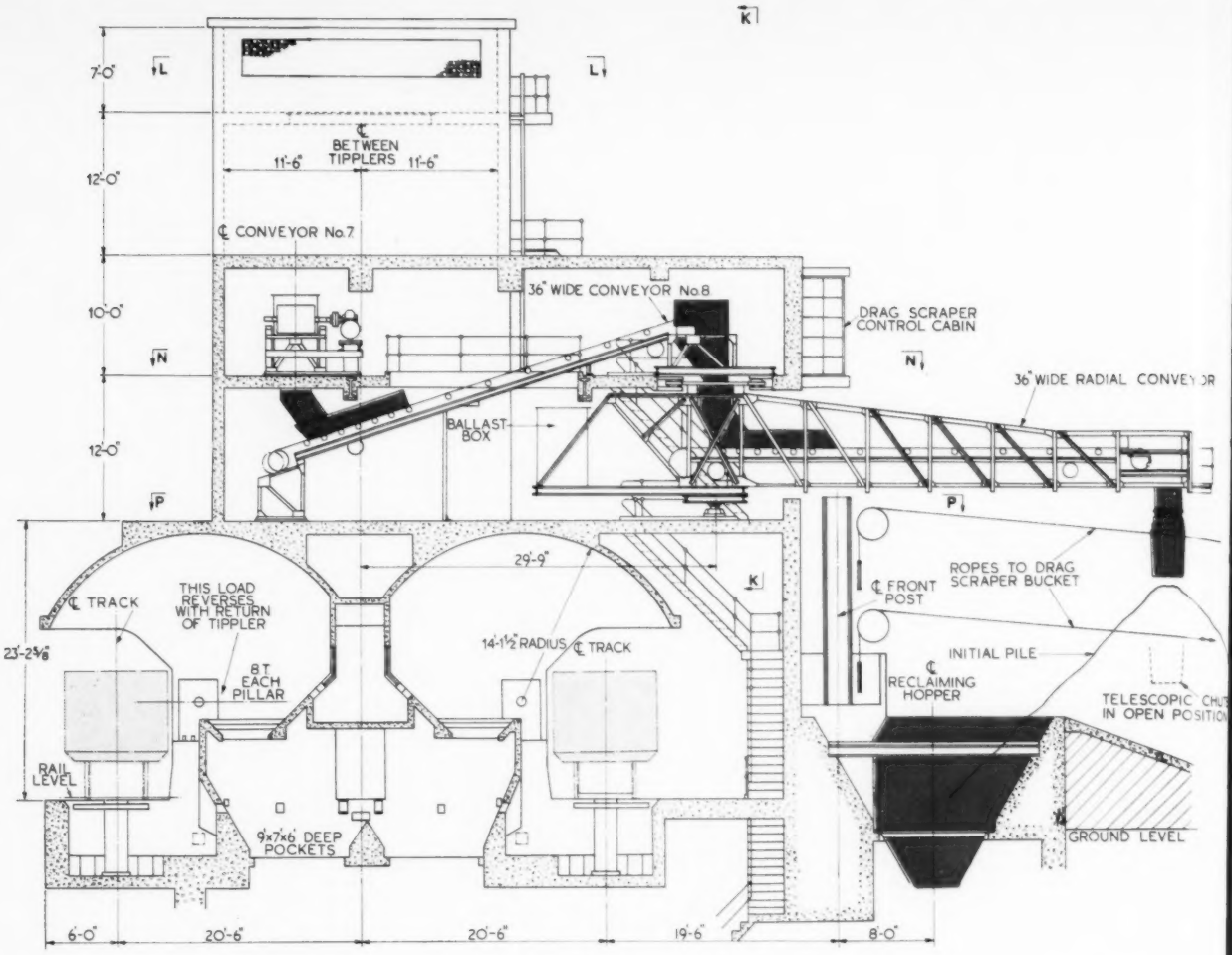
The falling coal passes through a coal entry valve which is normally closed, but which is automatically opened soon after the tippler commences to rotate. The coal is thus free to fall into the hopper and the dust emitted is able to expand into the dust-settling chamber which opens into it. A large-area air valve is located in the roof of the dust-settling chamber, which opens simultaneously with the coal entry valve. The air valve ensures that no coal dust blows back into the open air via the coal entry valve and the tipping chamber, as would occur if the displaced air and the suspended coal dust were discharged directly into a closed chamber. With coal bulking 44 cu. ft./ton, if using a closed-volume settling chamber, something like 440 cu. ft. of dust-laden air would be forced back, most of it into the open air, for each tipping of a 10-ton wagon, and when tipping one of the new-type mineral wagons of 24½ ton capacity, the volume of dust-laden air in question would be increased to very nearly 900 cu. ft.

The manufacturers' claim is that blow-back does not occur and that the air in the tipping chamber is comparatively clean, dust emission into the open air therefore being relatively low. Further details of design and oepration are given in Appendix 1.

Fig. 11. Close-up view of stocking-out conveyor, coal stock and drag scraper control room

APPENDIX 1

Coal tipping normally takes about 30 sec. The estimated average upward movement of the air in the settling chamber is from 15 in to, say, 32 in, depending upon coal wagon capacity, with a



SECTION A-A

settling chamber cross-section of 360 sq. ft. Corresponding figures for the average upwards velocity of the air within the settling chamber is from 3 ft/min to about 7 ft/min, according to wagon capacity. These velocities are low enough to give the dust within the settling chamber a chance to settle from one tipping cycle to the next, i.e. without cumulative effects. The air valve and the coal entry valve shut immediately on reversal of tippler motion, enabling the dust to settle out and fall into the coal hopper. During the tipping operation, due to turbulence, the dust will rise to higher than the 15 in and 32 in figures given, but in rapidly decreasing density and settling out all the time. This dust cannot be agitated by the wind.

For every wagon load of coal supplied, a wagon load of coal must be withdrawn from the hopper, and air must take its place. This is supplied through a very small aperture in the air valve, open when the air valve is actually closed. Leakage of air into the dust-settling chamber, through this valve aperture, replaces the drawn-off volume of coal in the hopper. This displacement air is relatively clean. In operation the air in the settling chamber is therefore raised by 15 in to 32 in when discharging a wagon of coal, and it is lowered by an equal amount, though more slowly, as the corresponding volume is drawn off. The net effect is prevention of build-up of dusty conditions within the settling chamber, a breathing action only taking place. The air valve is protected from wind gusts by means of a close mesh grating which permits sufficient breathing action at the required low working air velocities. The coal entry valve is of the horizontal plate type, covering a clear aperture of 23×4 ft, giving quick uninterrupted flow of coal into the hopper. The valve plate is withdrawn and re-closed by compressed air.

Fume and Dust Exclusion from Control Towers

Within buildings such as drag scraper control towers, conveyors automatic weighbridge equipment rooms, junction towers, etc., if fume and dust invasion can be prevented. economies will result due to reduced cleaning bills, reduced contamination of control equipment, reduced sickness, as well as reduced dust explosion hazards.

Essentially, this is a matter of sealing the building in question, arranging for an internal ventilation system, the aim being to prevent entry of stockpile or wagon coal dust carried by the wind. If coal wagons are tipped under dust-controlled conditions, and all handling plant is properly sealed against dust emission at changes of direction, there should be no ingress of coal dust.

At Goldington Power Station an approach has been made to solve these problems by avoiding openings in control towers, etc., where possible, modern fenestration being used, as shown in Figs. 5, 6, 7 and 11.

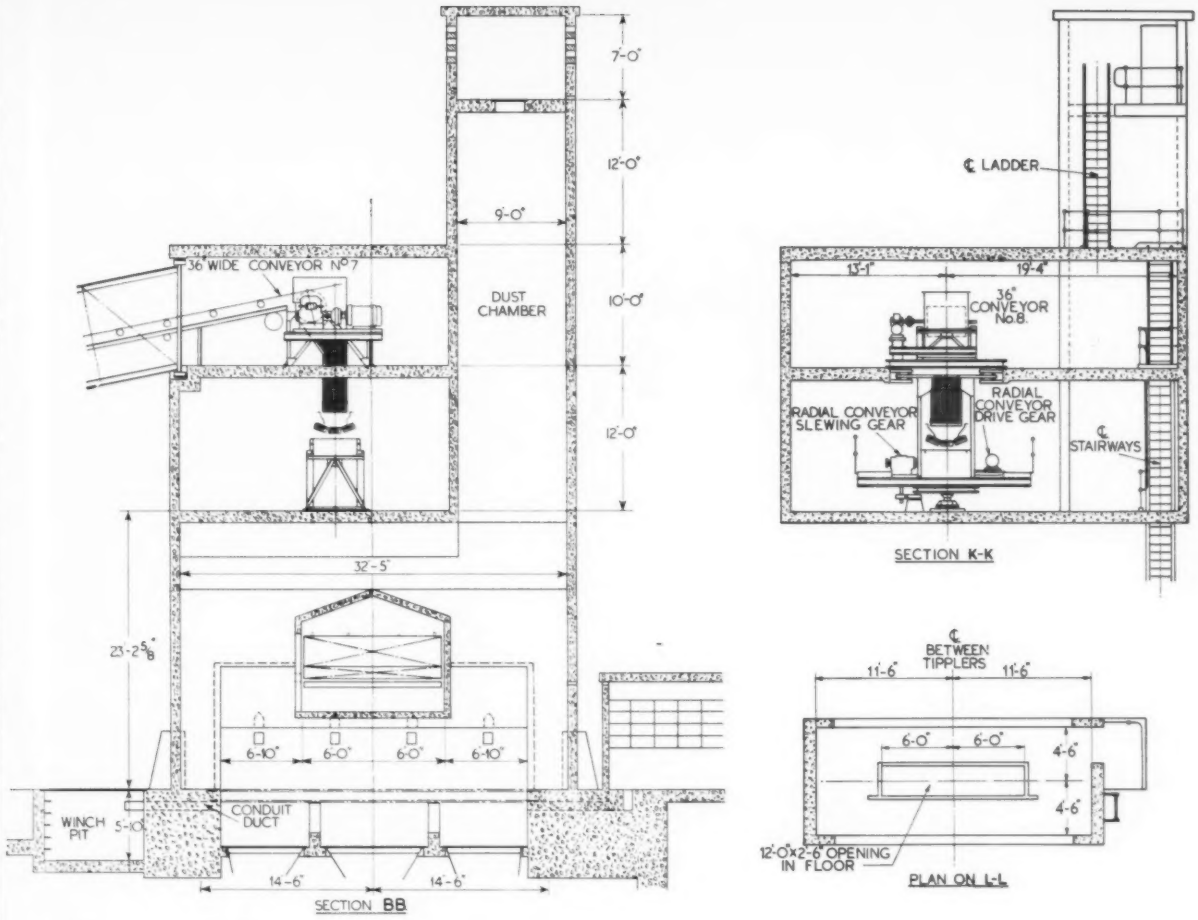


Fig. 13 (above and on opposite page). Layout of tippler house, showing construction of stocking-out conveyor (No. 9 conveyor) and cross-section through tipplers Nos. 1 and 2

Wet Coal Handling Problems

Thermal power stations in the South of England and north of the River Thames have to rely mainly upon coalfields in the Midlands for their coal supplies. Generally, these are characterized by fair amounts of slack and moisture, as well as appreciably high ash contents. The coal received at Goldington Power Station, for example, is mainly of $\frac{3}{8}$ in and under in grading, the actual percentage of $\frac{3}{8}$-in coal usually being very low. The combination of small coal and high moisture content tends to enhance arching and sticking in chutes, on pulleys and on idlers. This point was dealt with in the original coal handling plant specification, where the requirement is stated to be a handling plant for dealing with rough small or crushed slack, having a total moisture content of up to 22 per cent, received on site in railway wagons, and known to have poor free-running qualities. Tenderers are asked to bear this point in mind when designing chutes and hoppers.

At Goldington Power Station Syntron electro-magnetic vibrating feeders are employed wherever applicable, in order to keep the coal moving out of hoppers, and as mechanical aids in the unceasing battle against arching. There is, as yet, no complete answer to the arching and sticking of wet small coal. Electro-magnetic vibrating feeders do help to control the problem, but additional measures are also necessary. Where possible, coal chutes should be perfectly vertical, but in this case, of course, direct impingement of coal tends to increase conveyor belt wear. Another measure, widely used at Goldington, is that of employing 60-deg chute and hopper valley angles. These, in conjunction with electro-magnetic vibrating feeders, enable constant feeds to be obtained, giving efficient coal throughputs throughout the operating range of coal moisture, grading and boiler output.

The location of the Syntron vibrating feeders may be seen from the diagrams, (Figs. 4, 7, 13 and 14). Typical cross-sections through 60-deg valley angle chutes and hoppers may be seen in Fig. 14.

Built-in Safety Devices Given Prior Consideration

The Central Electricity Generating Board is one of Britain's major users of bulk materials handling equipment, particularly troughed belt conveyors. It is therefore extremely pleasant to learn of the Board's policy in connection with promotion of built-in safety devices. Safety standards vary somewhat from power station to power station and Goldington may be considered as a power station where special care has been taken to incorporate the maximum of up-to-date practice in this field.

This power station has, for example, guards designed to eliminate free space at belt and pulley nips and belt and idler nips, as called for in British Standard Specification 2890, *Troughed Belts for Conveyors.*

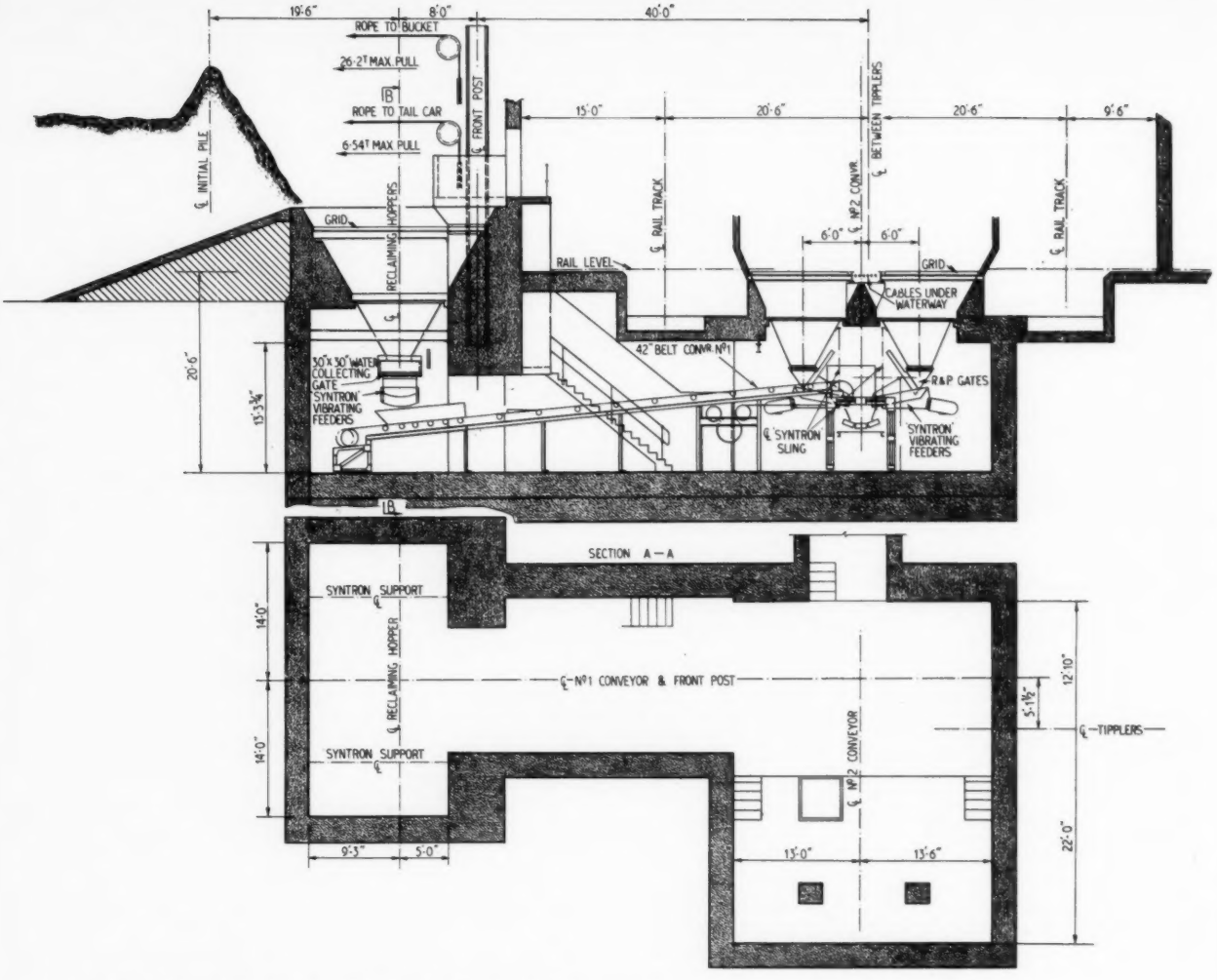
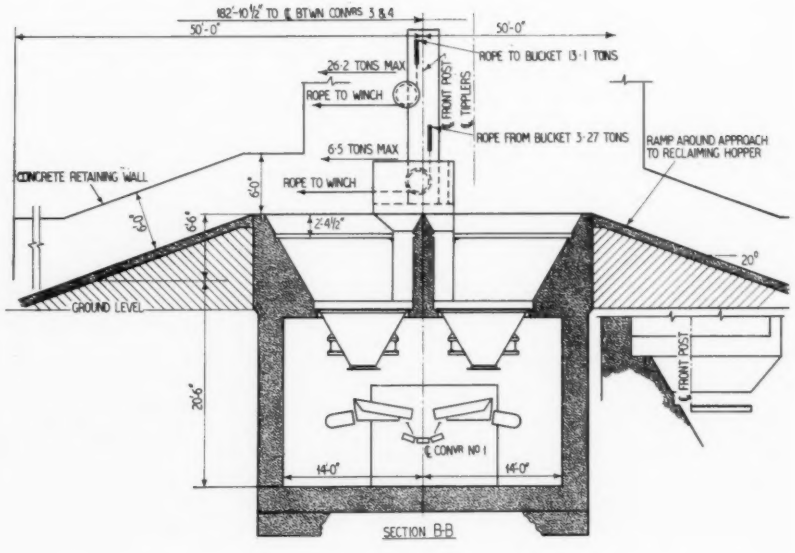


Fig. 14. *(above and below) Details of tippler and reclaiming pit construction*



The safety policy of the Central Electricity Generating Board, as explained in Appendix 2, is to provide safety trip chains alongside the full length of each belt conveyor, so that in the event of an attendant catching his sleeve in an idler, he can at once reach out with his other hand and operate the trip chain. This not only trips that particular conveyor, it also trips all conveyor belts running in series with it and feeding it. None of these conveyor belts, nor the one alongside the trip chain operated, can be started up again until the tripped switch has been re-set.

(to be continued)

THE TREND OF CRANE CONTROL, FOR INDUSTRIAL CRANES

By G. V. Sadler, M.I.E.E.*

THE RECENT easing of pressure in crane manufacture, whilst not welcomed, at least gives a chance for manufacturers to take stock of their products, and set about overdue improvement and redesign. Those who build cranes and lifting equipment have been producing at full capacity for nearly 20 years past, and there has not been a great deal of new development work done on the products produced. In fact it may seem strange to other industries to observe that many overhead travelling cranes of manufacturers' 'standard' types with mechanical and electrical equipment, virtually unchanged for a quarter of a century, still have a ready sale to-day in this rapidly changing world.

It is not the purpose of this article to discuss the moral implications of this on industry, but rather to indicate the trend of development in lifting gear, with particular reference to what happens at the crane hook. After all, a purchaser of a crane has loads to lift and move, swiftly and safely, and the crane hook is that part of the machine which is under close and more constant observation than any other part of a crane.

A crane of any type consists essentially of a structure carrying the mechanism to which the hook is connected, usually by steel wire ropes, and its essential function is to lift, move, and lower loads by suitable hook movements. The load slinger is not especially concerned with the structure, in so far as it does not come crashing about his ears when the crane is lifting any load it is allowed to lift within its rated capacity. He is most concerned with hook movement and its effect on the slinging and safe carrying of the load being moved. With few exceptions, hook movement to-day is initiated by an electric motor, and transmitted through suitable gearing to the load ropes.

The choice of motor and its control equipment to give the desired results at the hook, sets a problem which is capable of a vast number of possible solutions. It is a problem which grows in importance and complexity every year, as more and more ways of controlling an electric motor issue from the electrical manufacturers.

Forty years ago it was relatively simple. The standard method of speed controlling motors was by means of tramway-type drum controllers, or simple contactor gear, and every crane maker fitted this kind of equipment to his products. The results at the hook were reasonable, depending to no small extent on the skill of the driver. Load lowering was not easy. The D.C. series motor needed some form of mechanical load brake if the load was not to run away, the A.C. slipring motor could attain considerable overspeed when lowering on the first resistance notch, only reaching a steady synchronous speed when the controller was pushed to the full speed notch.

Early in the 1920's 'potentiometer' control for D.C. crane motors made its appearance, and this was a considerable step forward in the safer lowering of loads. It had its disadvantages in that light hook lowering speeds were slow, and took a heavy line current, the design of solenoids for hoist brakes needed modification, regenerative currents had to be dealt with, and if the supply failed whilst lowering a load, it was not possible to stop it unless the controller handle was brought back to the 'off' position. The early attempts to improve hook speeds with 'potentiometer' control, and recapture the advantages of a D.C. series motor for load handling caused commutator troubles in the motors themselves. This form of D.C. motor control is, of course, still widely used to-day, but, with improvements in the design of motors and control gear, the early troubles have almost disappeared. The consequences of power supply failure and regeneration problems, especially when a local rectified D.C., supply is used, are still with us on the simpler forms of potentiometer control.

It is in many ways a disturbing fact that after nearly 40 years, so many cranes are sold to-day with motors and control gear virtually unchanged, except for minor improvements. Load slingers are offered a hook performance

A crane control unit with speed regulators in place of drum controllers

* The Vaughan Crane Company Ltd.

which is little or no better than that offered to an earlier generation of these men. This is not to deny that a great deal of work has been done by crane and electrical manufacturers to produce equipment which will give good variable speed control in all directions at the hook. There are many good systems available to-day, well known to industry, which in their respective characteristics will cater for all special requirements of load handling so far envisaged. But these are still not regarded as standard items of equipment.

The obvious reason for the restricted sale of speed control schemes on cranes is, of course, competition. But here competition and the price factor has ceased to operate for the benefit of the user, simply because the economics of crane hook performance have never been fully publicized. The effects of hook speeds on load slinging and handling are being studied in several fields, but the results of these will need to be much more widely known. Many years ago a writer in the U.S.A. stated that 'it is not good enough for a crane just to jerk the loads around'. But many users are content so to do because they are afraid it will cost them a lot more money in capital outlay and subsequent maintenance to have a better performance, kinder to loads, slingers, and above all, operators.

What then are the basic requirements for good hook performance on a crane? It is difficult to postulate an ideal performance, but a practical one, desired by load slinger and operators, is shown in Table 1.

TABLE 1

1. A fast lowering speed for the light hook.
2. Fully variable speeds for all crane motions. These should be available for all loads within the crane capacity. (A 30:1 speed range is not too great.)
3. Facilities for several constant speeds from 0-30% full speed, or fully variable speed control over this range.
4. Quick acceleration from 30% to full speed.
5. Continuous deceleration from full speed to creep speed when lowering loads.
6. Graduated braking for any traction motion, as distinct from hoisting and lowering.
7. Preferably a faster hoisting speed for handling loads under 30% full load, than normal full load hoisting speed.

There are crane control systems which cover all these seven points, but they are more expensive than non-variable speed systems. Engineers naturally have to be convinced that the advantages of having this '7-point' crane control available, represent a worth-while capital investment.

An analogy presents itself in two other engineering products. Almost all passenger and goods lifts installed to-day are fitted with push-button control, and automatic floor levelling.

The advantages in load handling are so manifest that these features are now standardized and no longer offered at an extra price over a simple manually operated drum controller, as fitted in early lifts. A buyer of a machine tool is now only interested in its output in terms of feeds and speeds. The latest electrical control gear systems to give the highest efficiency to the machine in question are included as a standard. Machine tools have long graduated from the belt drive and manual controller stage.

This puts the crane problem into its true perspective. A crane is materially a load-handling machine, and above all, should handle loads with a minimum of cost. It has been said that materials handling adds something to the cost but nothing to the value of a finished product. Surely any equipment which reduces the cost of load handling must receive careful consideration.

How, then, does a good 'hook performance' achieve a cost reduction in load handling? There are three principal reasons:—

(*a*) The avoidance of inching by the adoption of a wide speed range, and the reduction of load swing by controlled braking, enabling loads to be accurately placed in a minimum time without damage to them.
(*b*) Reduction in physical effort required from crane driver and slinger, enabling more loads to be handled efficiently and safely in a given time.
(*c*) Reduction in time spent on crane maintenance, due to less wear and tear on mechanical and electrical equipment, and a reduction in shock loading of crane structure.

A careful assessment of these savings in time and labour over a week, month, or year, will be found to justify the additional initial expenditure to obtain the '7-point' hook performance.

Every handling plan for a crane differs to some degree, but typical examples are given below, indicating expected savings as outlined above.

Example 1.
10-ton 3 motor Crane, 60-ft span.

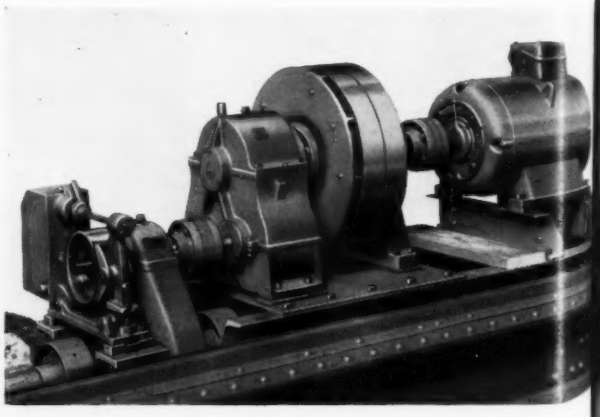
Hoist speed	— 10 tons at 25 f.p.m./0·8 f.p.m.
Traverse speed	— 10 tons at 100 f.p.m./4·0 f.p.m.
Travel speed	— 10 tons at 300 f.p.m./10·0 f.p.m.
Control	— from driver's cage.
Duty	— Loading and unloading castings into machine tools, and shop transport of castings.

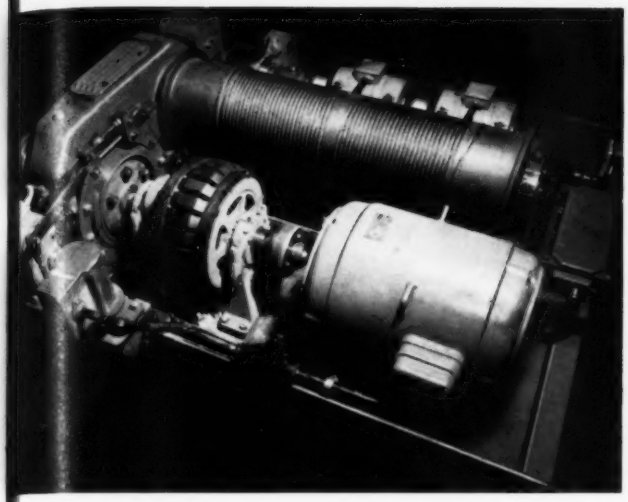
Average number of crane movements per hour:—

Hoist	— 6
Lower	— 6
Traverse to	— 9
Traverse fro	— 9
Travel to	— 6
Travel fro	— 6

Standard Crane Movement time in 60 min. = 48 min.
25 per cent estimated reduction in times by use of wide speed range crane reduces 48 min to 36 min. Assuming crane service is adequate, the time saving is passed on to machining times.

The traction drive unit of an overhead crane including a reversing magnetic coupling





The crab of a travelling crane fitted with magnetic couplings in the drives

A 12-min saving in 60 min is equivalent to 20 per cent, representing approximately a 15 per cent reduction in machine loading time. On an assumed basis of 12 machines in the shop, this could represent a total of 40 min/day. In 50, 44-hour weeks, this is equivalent to 175 hours/year, or an output increase of 2·9 per cent.

Example 2.
5-ton 3 motor Crane. (Standard)
Loading and unloading duties on process work.
Hoist speed — 5 tons at 40 f.p.m.
Traverse speed — 5 tons at 100 f.p.m.
Travel speed — 5 tons at 300 f.p.m.
Control — From driver's cage.

Average number of crane movements per hour:—

Hoist	— 15
Lower	— 15
Traverse to	— 30
Traverse fro	— 30
Travel to	— 30
Travel fro	— 30

Time saving in each hoist/lower, due to absence of inching, by using wide speed range crane = 10 seconds.
Time saving in each Traverse, due to absence of inching, by using a wide speed range crane = 8 seconds.
Time saving in each Travel, due to absence of inching, by using a wide speed range crane = 7 seconds.
Time saving in each round trip = 25 seconds.
Time saving in one hour = $6\frac{1}{2}$ minutes.
Time saving in one week of 44 hours = $4\frac{3}{4}$ hours.
This is equivalent to 70 additional trips per week.

These two examples, whilst only typical, are indicative of the kind of savings in handling time which may be expected with high-performance cranes in daily service, handling relatively inexpensive loads. There is a widespread tendency to install minimum requirement handling gear in the absence of available information on what might be termed 'hook performance efficiency'.

It is not the intention to describe in detail the many types of control systems for cranes which have found their way on to the market since the war. The great majority of them are intended to provide D.C. characteristics to cranes which perforce run on an alternating current supply. It is, however, a sheer waste of good money to install a rectifier to give a D.C. supply to new cranes in the mistaken idea that a better hook performance is thereby gained.

Motors and control equipment are available to-day which will give the seven-point performance described on page 396, whether the electric supply is A.C. or D.C., with equal facility and reliability, but the user should not have any inhibitions about the use of some form of electronics in the system any more than he would have in the purchase of a new machine tool. Electronic equipment is now perfectly reliable on crane control provided it is supplied by a reputable maker whose circuitry is correctly designed and equipment properly rated for crane duty. Magnetic amplifiers and transistors are replacing more fragile valves. Fail-safe circuits are readily incorporated, and safeguard the crane, the operator, and please the Factory Inspectorate. Experience has shown in recent years that the most successful equipments to give good hook performance are those designed through close collaboration between crane maker and control-gear maker. This is likely to mean that some part of the mechanical design of the crane is modified to suit the electrical requirements, and vice versa. The result is more likely to produce a homogeneous balanced piece of mechanism.

Unfortunately, there are many crane control systems, even including specially designed rotating machinery, which are offered *en bloc* to crane makers, who then have to work them in to existing designs. The resultant hook performance may be reasonably good but the crane overall appearance is offensive. Appearance design applied to all types of cranes is long overdue in this country.

What then can the crane user expect to receive as a drive and control medium if he calls for a high-performance crane? Much depends on the weight of the load. For cranes handling 75 tons and over, Ward-Leonard equipment is increasing in favour, particularly as its true function in crane control is being better understood, and more sensitive and easily operated control equipment is now available. This will certainly include some electronic gear, but so does much modern rolling mill drive nowadays.

For lighter cranes, handling 20-75 tons, Ward-Leonard equipment may still be the best equipment, but a close runner-up, is the drive incorporating eddy-current couplings driven from squirrel cage, non-reversing motors. Properly designed and installed, this drive gives a very good hook performance, closely comparable with Ward-Leonard, and certainly less expensive.

Smaller cranes in the 3-10 tons capacity class may, as an alternative to eddy current drives, utilize variable voltage rectifier systems and D.C. motors. Only in recent years have suitable rectifiers become available for this kind of duty, and it is likely that crane control developments on these lines will occur. The provision of D.C. motors, thus controlled, on small cranes, is economically possible in relation to good hook performance. Only on the light duty, small tonnage crane, is it ever desirable to accept a modified hook performance, and where this can be done without detriment to load handling, squirrel cage driving motors, contactor operated, are admirable, but it is always advisable to use slow-acceleration motors on traction drives. The real bane of crane makers is the accommodation of resistors, whether for series D.C. motors, or for the rotors of A.C. slipring machines. These, and line current drum controllers, are really outdated in modern cranes, and the drives briefly described hitherto, avoid these encumbrances. Line current drum controllers for A.C. and D.C. motors have changed little over the last 35 years, and to use them for motor control on modern machines is scarcely redolent of progress, particularly when selling abroad. The

argument that 'it does the job' is rapidly losing its force in competitive foreign markets.

There has always been a demand for cranes for specialized handling duties, requiring a hook performance which necessitates additional electrical equipment over present standards. This demand is now expanding, particularly in the nuclear engineering field, where the handling of machines and materials often calls for special cranes, with very accurate positioning of loads. In effect a crane with a hook performance similar to that given in Table 1 meets this demand, apart from some probable mechanical modifications. If, therefore, Table 1 performance was more generally recognized for industrial cranes, the equipment needed for so-called specialized cranes would already be standardized, with consequent estimating economies for the manufacturers, and lower prices for the purchasers.

Another aspect of hook performance is that of maximum lifting speed for a given load. Many users rightly feel that this should be high, to produce speedy load handling. There are two main arguments against any unconsidered natural desires on this point.

1. *Cost*

Every crane maker knows that to double a given standard hoisting speed, to meet a particular demand, increases the total crane price by many hundreds of pounds. These 'standard speeds' have been fixed on a known average demand over the years, coupled with the characteristics of standard crane control gear to give safe working under all conditions.

2. *Performance*

A high maximum hook speed used with non-variable standard speed control systems, can produce dangerous conditions for landing, inching and slinging loads. Similarly, most of the available variable speed systems are designed for a 15 per cent to 10 per cent speed, and thus, with maximum speeds of the order of 40-50 f.p.m., the minimum speed is too fast for accurate positioning without inching. The advantage of using a wide speed range control system with a high maximum hook speed is thus considerable, as really slow minimum speeds are then available, giving a good hook performance.

The required hook performance from a great many cranes, whilst necessitating fast hook speeds, does not require them for the heavier loads, which may only be lifted infrequently. As stated above, the cost of providing high speeds for heavy loads is considerable, and an advantageous compromise is often achieved by providing high speeds only for loads of 50 per cent and less. This characteristic is not achieved simply by the use of a straight series D.C. motor, but must include a motor with two-speed constant horse-power characteristics. These are available, together with simple control gear.

There is no 'standard' equipment for this purpose, but development is being done in several quarters on these lines, using modern techniques. For larger cranes on an A.C. supply it might well be that the application of Ward-Leonard principles to a slower speed heavy load lifting motor on D.C., with a coupled A.C. machine for providing high speeds for lighter loads, gives the desired characteristic to the hook.

Attention is being given to the problem of more efficient crane utilization in terms of labour employed. This concerns more particularly overhead travelling crane installations in assembly shops and the like, operated by drivers in cabs on the cranes. Whilst not a crane control problem, as applied to hook performance, it is an extension of it, and is analogous to that of lift control.

All modern lifts are of the self-service type and unmanned, the empty lift proceeding to the floor where a user has pressed the call button.

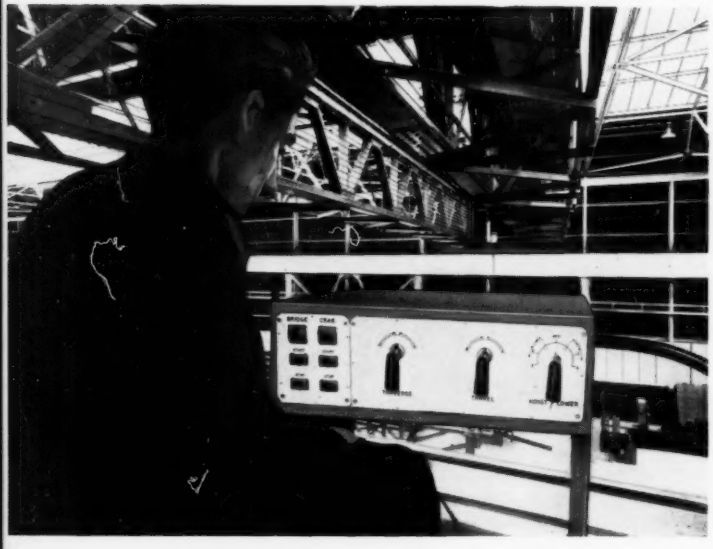
One system can be applied to overhead cranes in many shops, in which a number of call stations comprising two-point push-button boxes ('call' and 'emergency stop') are provided along the wall of the shop. One additional conductor wire suffices for transmitting signals from any station to the crane which is push-button controlled. When not in use, a crane is parked anywhere along its track with hook and push button at their highest positions.

When any call button is pressed, crane proceeds to that station and lowers its push button box to working level. The push-button box is suspended from a small motor-driven winch on the crane. The slinger or floor operator uses the crane in the normal way, and when he has finished with it, presses the 'release' button on the pendant push-button box hanging from the crane. The empty hook and box are then raised to parking position, and the crane is free to be summoned to any other part of the shop.

It might also be mentioned that crane accessories such as brakes and limit switches are receiving attention, as on these important items depends the success of any crane control system. It should not be long before very efficient disc-type brakes with marked anti-fading properties are available for crane drives, and the use of inductor-type limit switches which eliminate the use of mechanical tappets and skates, have already made their appearance in some quarters. Further contributions towards safety in cranes are being made by new supply systems for cranes, eliminating the hazards of bare wire conductors along crane tracks and across the crane bridges themselves.

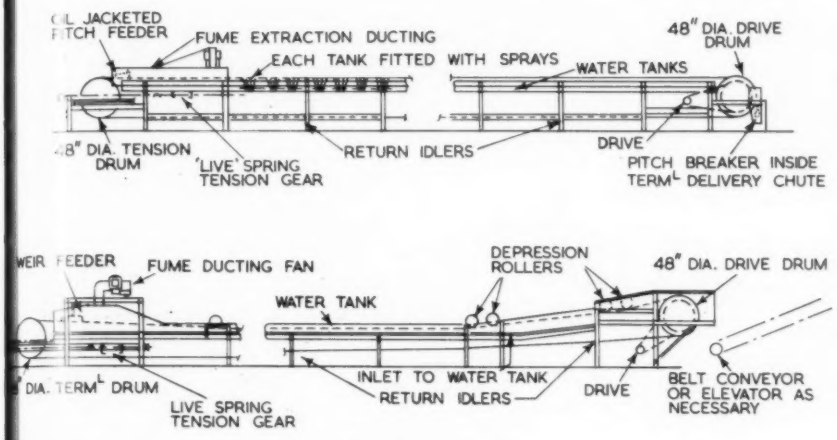
In conclusion, it should be stated that this article is not purposely contentious, although it includes opinion besides facts. British crane engineering is fully alive to all the demands it may be called upon to meet, and can meet them. The user must be convinced that he is getting value for money in terms of hook performance and crane utilisation. A closer collaboration between him and the manufacturer will ensure the technical advancement of the product, and enhance the status of British cranes in the export market. It might be remembered, that the technical education of many young engineers and potential buyers, in rapidly developing countries overseas, begins with push-button controls and electronics, and they have come to expect and accept these features on lifting gear, as on other machinery.

The control panel for a modern wide speed range overhead crane



STEEL BAND COOLING CONVEYORS

The cooling and flaking of hard and medium-hard pitch using Sandvik steel band cooling conveyors



(top) Arrangement of spray type pitch cooler

(below) Arrangement of submerged type pitch cooler

THE PITCH INDUSTRY has shown increasing interest in recent years in the equipment and methods available for cooling pitch as it is discharged from the distillation column. The problem is to cool the pitch rapidly enough for it to be handled easily, stored or despatched immediately it is discharged from the distillation column, obviating thereby the need for large pitch beds.

An effective solution to this problem is by the use of Sandvik water-cooled steel band conveyors which cool the pitch by two distinct methods.

Method I is 'the water-bed or spray type' in which the cooling water never comes into contact with the pitch. The essentials of its operation are that the steel band conveyor carrying the pitch moves forward over a series of water tanks down the centre of which is a water pipe fitted with spray nozzles. These work under a pressure of 20-25 lb/sq. in. and spray the underside of the steel band with cooling water which falls back into the tank where it is collected and either re-circulated through a cooling system, run to waste or re-used in other parts of the installation. By the time the pitch reaches the driving drum it is in a hard brittle form and cracks and breaks away from the steel band to be delivered as flake over the drum.

Method II is the 'submerged type' wherein the pitch is always in contact with the cooling water. In this method the steel band conveyor, instead of passing over the top of the water tanks, passes under a set of depressing rollers sited on the edges of the band which take the band and the pitch into a water-bath, so that the whole is completely submerged during its travel from one end of the conveyor installation to the other. At the discharge point the steel band is lifted out of the water on an incline where rubber squeegees remove the surplus water from the now solid pitch. The cracking and splintering of the pitch takes place over the delivery point.

To ensure that the pitch can be handled easily, both types of conveyor systems have a set of breaker gear fitted at the delivery point.

The ancillary equipment for both types of plant is virtually identical. A weir-type feeder is used to spread the pitch on to the band in an even layer. The feed can be either direct from the distillation plant or via a straight forward holding tank situated above the feeder or through a holding tank sited similarly but having a balanced closed circuit flow. This latter method is preferable as it enables the flow of pitch to the weir to be maintained at a constant head regardless of the level of the pitch in the holding tank.

In any event, the weir feeder is simply the means of spreading out the pitch and of preventing eddies and surges so that an even flow is presented to the steel band. The point is that whatever device is used to spread the pitch it should incorporate a control valve to vary the input of pitch to the feeder and to provide a by-pass in the event of an emergency.

The weir feeder is constructed of mild steel and is either steam jacketed or oil jacketed and fitted with immersion heaters. It has been found, however, that the design of the steam jacketed type of feeder to withstand temperatures of steam much above 100 deg C is impractical. With the oil jacketed type, fairly high temperatures are possible with very low pressures and the feeder can, therefore, be of a much lighter construction.

The oil jacket of the feeder has a capacity of approximately 7 gal of oil which is heated by two 2-kW Tubalox oil immersion heaters and controlled by a Satchwell immersion thermostat. The whole of the outside of the feeder is lagged. The two immersion heaters are in operation for only a short time at the beginning of the conveyor run as the temperature thereafter is maintained by the heat from the pitch.

The feeder is mounted above the steel band with a small gap between the lip and the surface of the band so that the pitch flows smoothly from the feeder on to the steel band. The band is already chilled when the pitch is fed on to it and thus the immediate spraying of the underside of the band from the spray nozzles or the submerging of the band into water—depending on which method is employed—prevents any appreciable spread of the pitch towards the edges of the band.

The viscosity of the pitch is governed by the pitch feed to the weir and by controlling the speed of the steel band which is variable over a fairly extensive range. One point worth noting is that when the pitch is first fed on to the

band, a certain amount of fuming takes place which can become quite severe, depending on the initial temperature of the material. Because of this fact it may be necessary to mount a fume hood and exhaust fan at the feed point.

After delivery over the terminal drum, the pitch is conveyed and elevated as required either into stockpiles or into hoppers for feeding directly into lorries or railway wagons. In some instances where the plant is adjacent to a railway siding, the conveyor installation has been installed at a high level with the terminal drum delivering directly into railway wagons.

At the present time there are three cooling conveyors of the 'water-bed or spray type' in the United Kingdom two of which are owned and operated by the National Coal Board. One is installed at the Avenue Carbonization Works at Chesterfield; the other at the N.C.B. Tar Plant, Caerphilly, South Wales. The third installation is owned by a private pitch manufacturer.

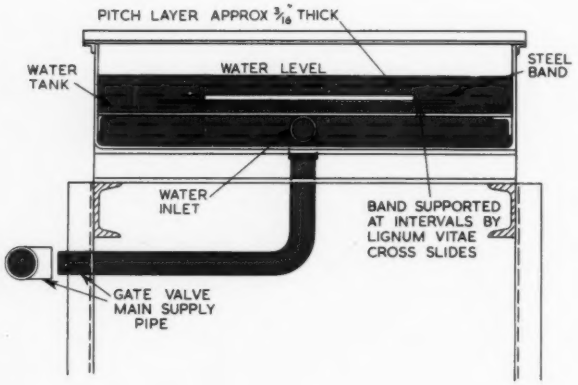
There are two 'submerged types' working in the U.K. and at least two on the Continent.

There are advantages and disadvantages with both systems. In the water-bed or spray-type system, the pitch does not come into contact with the cooling water so that there is no danger of water contamination. On the other hand, reports on the operation of the submerged type state that the water content is less than 0·5 per cent.

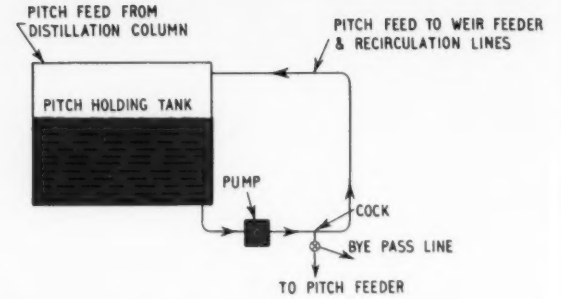
The spray type is, in general terms, a less efficient cooling device than the submerged type and therefore a longer conveyor is required for cooling the pitch under the same conditions. This is offset to some extent by the fact that the pitch stream needs to be narrower on the submerged type in order to accommodate the depressing rollers. In general terms, however, it can be said that on plants of average capacity, a submerged type of installation requires a steel band conveyor only three-quarters of the length required for the spray type.

The central advantage of the submerged type is that the pitch can be produced in a thickness of approximately $\frac{3}{16}$ in against only $\frac{1}{16}$ in with the spray type and there is considerably less danger of the thicker material breaking down into dust. Moreover when operating a spray-type system on exposed sites, it may be necessary to fit a cover over the top strand and latter portion of the conveyor to prevent solidified pitch from being blown out.

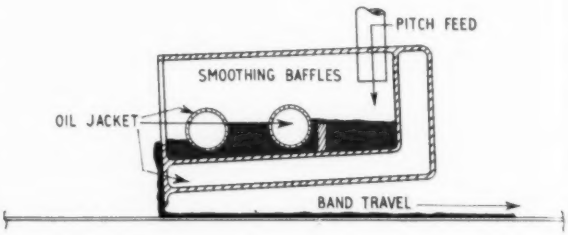
The following table provides details as to lengths, capacities and water consumption for the various grades of pitch. The data given assume that the initial feed temperature of the pitch is approximately 220 deg C with softening points of 120, 100 and 80 deg C R & B. It is also assumed that cooling water is available at 25 deg C.



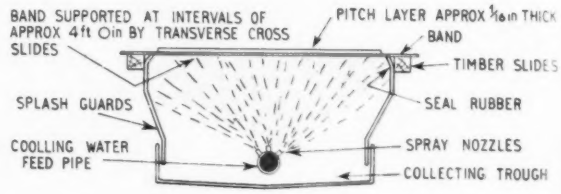
Section through submerged-type cooler



Balanced closed circuit feeding arrangement



Oil jacketed weir feeder

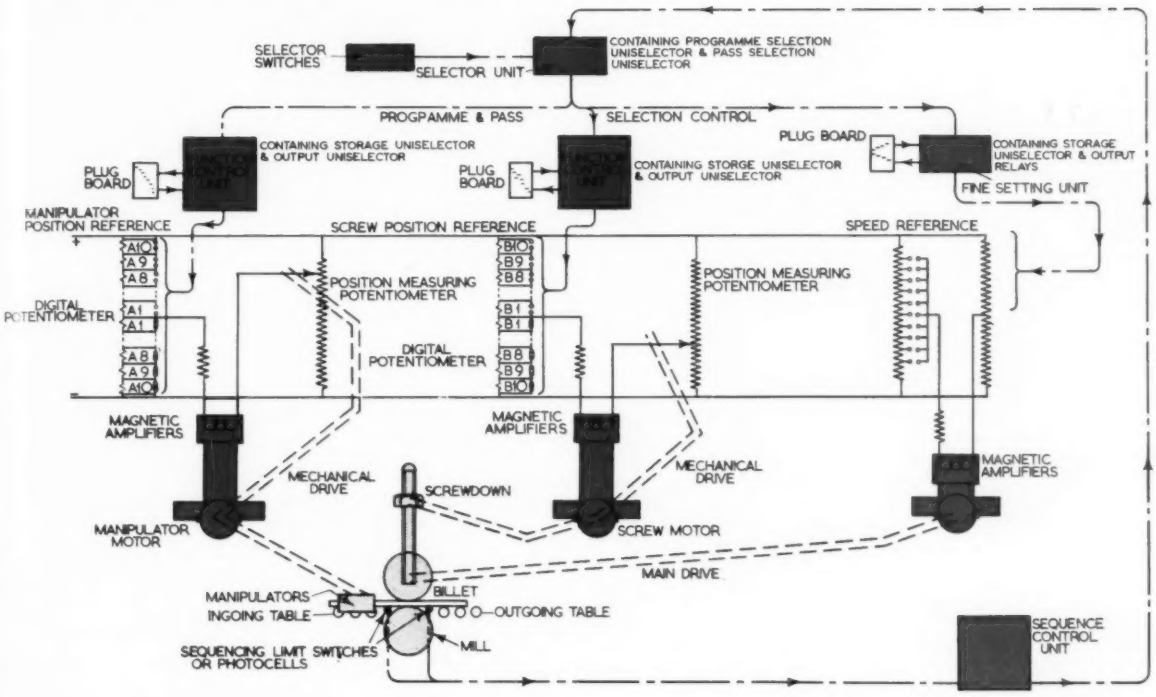


Section through spray-type cooler

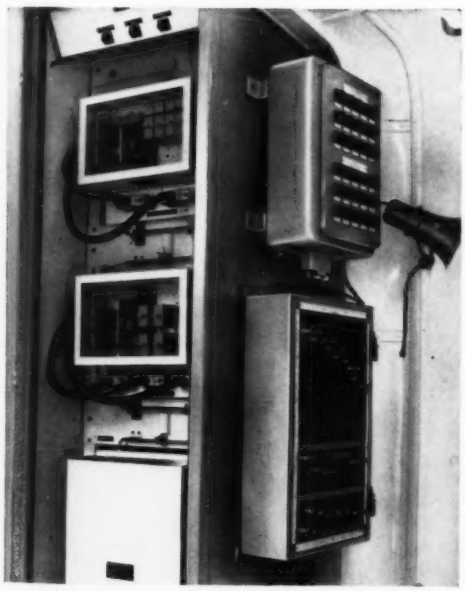
Capacity tons/hr	Temp. R & B	Approx. discharge temp. deg C	Submerged type		Water spray type	
			Crs. of conveyor	Water consumption	Crs. of conveyor	Water consumption
	deg C		ft	g.p.m.	ft	g.p.m.
1½	120	40	60	45	65	70
1½	100	35	65	45	75	70
1½	80	30	75	45	90	70
2	120	40	75	60	80	90
2	100	35	80	60	95	90
2	80	30	95	60	115	90
2½	120	40	85	75	100	110
2½	100	35	95	75	120	110
2½	80	30	115	75	145	110
3	120	40	100	85	120	130
3	100	35	110	85	140	130
3	80	30	135	85	170	130
4	120	40	125	100	160	150
4	100	35	140	100	190	150
4	80	30	170	100	230	150
5	120	40	150	120		
5	100	35	170	120		
5	80	30	210	120		

NEW AUTOMATIC EQUIPMENT

Control for Large Industrial Drives



Block schematic diagram of rolling mill drives with automatic programmer



Picture shows one of the cabinets of the automatic programming equipment with the door open. At the top right are lights to indicate programme selection and pass selection. On the bottom right is the plug board which is used to set up experimental programmes for unusual operations or for operations which will subsequently be wired into the main control cabinets

A NEW development in automatic control equipment to increase the efficiency and quality of steel production was demonstrated recently in London. A demonstration van was fitted out with a full-size equipment controlling an eighth-scale working model steel rolling mill, by the Metal Industries Division of The English Electric Co., Ltd., of Stafford. A team of English Electric experts tour with the van to show industrialists the applications of the new equipment, in controlling sequences of processing and production operations automatically.

The majority of rolling mill drives are at present manually controlled. All the movements of the roller tables carrying the piece of metal to and from the mill, the adjustment of the distance between the mill rolls, the manipulation of the piece of metal into the correct rolling channel and the control of the main mill drive itself, are done by hand- or foot-operated levers.

These operations follow a definite pattern of movement which can be reproduced in electro-mechanical form, stored in the 'memory' of the equipment ready for immediate selection. The number of movements for rolling an ingot slab or bloom into a smaller section can be correctly sequenced to become the 'rolling programme'. Any number of rolling programmes can be made up to suit different sizes

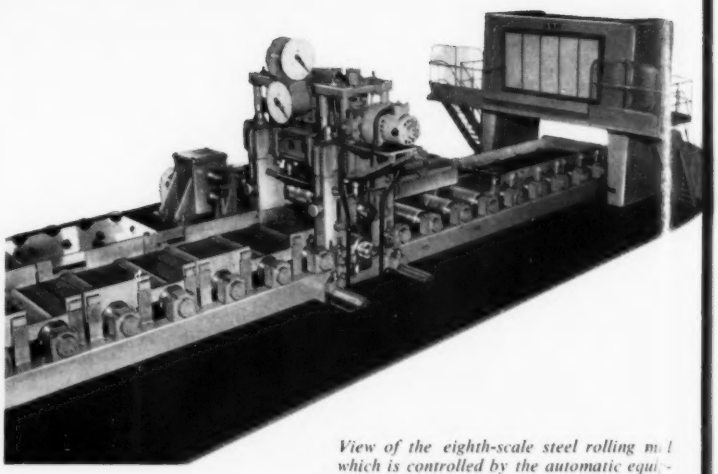
of material to be fed into the mill and of the product being made, and stored ready to select and put into operation by pushing a single button.

The heart of this programming equipment is a component called a translator unit. This is a motorized switching device, first suggested for this duty by the British Iron and Steel Research Association. English Electric have developed and modified this unit to make it suitable for the very rugged and continuous duty required by the metal-making and rolling industries.

The benefits are a more consistent quality of rolled product, greater productivity, less maintenance on the rolling mill and more efficient use of operating personnel. It has already been installed on one mill in the United Kingdom and is now being installed on others.

Automatic control in one form or another has been used for some years in light industries, but it is only recently that it has been introduced in heavy industries where expensive capital equipment demands a high standard of reliability. Other examples in the steel industry are automatic tension, gauge and coiling control on hot and cold strip mills and rod mills, where steel for cars, domestic appliances, furniture, the canning industry and the building industry is made. As a result of automation, products are more accurately dimensioned, and are being built at a faster rate.

The type of programming and automatic control equipment demonstrated by English Electric can also be used with other industrial drives where a definite pattern of controlling movements is followed through in sequence and repeated many times; a different pattern of sequence merely requires the storage of a different programme.



View of the eighth-scale steel rolling mill which is controlled by the automatic equipment contained in three cabinets in the alcove behind the demonstrator

Recommendations for further modernization and consolidation in the cotton industry raise the question of automatic control in this field. A good deal has already been done in the cotton industry by English Electric who have designed and supplied all types of automatic control systems and variable speed units for use on bleaching and finishing machines, dyeing machinery, hosiery and knitting machines and in tufted carpet manufacture, as well as general equipment for the electrification of the textile industry.

MICHIGAN BACKHOE DEMONSTRATED AT MINISTRY OF WORKS BUILDING PLANT SITE

A DRAINAGE problem at the Ministry of Works Exhibition site at Greenford was speedily tackled with a Michigan 75A Tractor Shovel fitted with a Backhoe attachment. This new Michigan combination was being shown for the first time and was set a task of cutting in two days approximately 1,000 ft of trench at an average depth of 4 ft.

The site conditions were extremely bad. Saturated earth over low-lying clay had been pot-holed by cattle and an average of 3-6 in of water lay overall. The 75A was not stopped by the axle-deep slush. The first 200 cu. yd. of heavy, wet ground and clay were excavated in two hours, and the site left to drain for six hours through the main channel. On the second day's work the site condition had begun to improve and transverse cuts were made. The 75A in addition to the Backhoe was fitted with a 1½-cu. yd. bucket which will later be used to fill the trenches with course aggregates, backfill the spoil and level the soil.

The demonstration showed clearly that the 4-wheel drive, high-flotation-tyred machine can work efficiently under most adverse conditions and the multi-purpose applications which are possible under this combined excavating, loading and levelling tool, allied to fast travel speeds, offer very great economies in time and manhours.

START-UP OF No. 5 BLAST FURNACE AT MARGAM

One of the 180-ton capacity torpedo mixer ladles which will be used at the No. 5 Blast Furnace of The Steel Company of Wales at Margam. The use of this type of ladle will speed up the transfer of molten iron from blast furnace to Melting Shop

RECENTLY Mr. Harold Peake, Chairman of The Steel Company of Wales, performed the lighting up ceremony which brought into operation the new No. 5 Blast Furnace at the Margam Works. The furnace is one of the main items of plant to be installed under the company's £52 million development scheme 'M'.

Present on this informal occasion were representatives of the engineers and contractors who for the last three years have been engaged on the building of the furnace as well as those who will now be responsible for its operation.

One of the Largest in the World

The furnace, with a hearth diameter of 31 ft, and a working volume of 59,365 cu. ft, ranks by all accepted standards as one of the largest blast furnaces in the world. It has an iron-making capacity of more than 10,000 tons/week.

No. 5 furnace, which is 248 ft high, stands alongside the No. 4 furnace which commenced operation in January 1956. The stockyard which serves No. 4 has been extended to cover both furnaces and now has a total capacity of 250,000 tons of iron ore.

Iron ore from the wharf and from the home ore tipplers reaches the stockyard by overhead conveyor and its distribution over the stockyard is achieved by means of a stocking out bridge. A reclaiming bridge lifts the ore from stock and deposits it on to a conveyor system to be carried to the bunkers. As the weekly requirements of foreign ore will be in the region of 63,500 tons/week a fifth transporter unloader has been installed at Margam Wharf.

Operation on Sinter

An important feature of the new furnace is that the layout makes it possible to operate entirely on sinter if this is required in the future. For this purpose a conveyor system links the ore preparation plant direct with the sinter bunkers at No. 5 Blast Furnace.

Blower and Stoves

Air for the furnace is provided by a 125,000 cu. ft/min axial flow turbo of Swiss construction. To preheat the air there are three 140-ft high stoves each fitted with automatic valve change. The stove shells, furnace top, gas cleaning plant and mains have been designed for possible high top pressure operation.

Torpedo Ladles

When the furnace is tapped iron will be run into 180-ton capacity torpedo mixer ladles, each 55½ ft in length. These ladles are fitted with their own tipping equipment powered by a 15-h.p. electric motor, and the use of them will speed up the transfer of iron from blast furnace to melting shop.

Slag Disposal

The slag from the furnace will be run straight into pits alongside the furnace. From these pits it will be loaded by

No. 5 Blast Furnace at the Margam Works of The Steel Company of Wales, Ltd.

mechanical digging equipment into heavy road vehicles which will carry it to the tips. This is similar to the method of slag disposal on No. 4 Furnace.

Construction Details

Owing to the nature of the ground on which the furnace and ancillary plant stands, it was necessary to drive 181 special piles to support the foundations. These piles, some of which were 39 in in dia and others 35 in, were driven to a depth of 70-80 ft.

For the construction of the furnace foundation block 9,680 tons of concrete were used, including 1,000 tons of refractory concrete. The portion of the foundation block below ground is constructed of sulphur-resisting cement to counter any attack by ground water which may be contaminated by the nearby slag pools.

The furnace is carbon lined to lintel level and in the hearth has carbon side walls with a refractory centre. 2,700 tons of steel were used for the construction of the furnace itself and 390,000 bricks went into its lining.

No. 4 Furnace to be Re-lined

Since No. 4 Blast Furnace commenced operation in 1956, it has produced more than 1,392,000 tons of very high quality iron and is now due for a routine re-line. It is therefore intended to take No. 4 out of operation for re-lining as soon as No. 5 settles down to production.

For this reason the 80 new coke ovens which have been installed at Abbey Works in anticipation of five-blast-furnace operation will not be brought into production until No. 4 furnace is ready to start operation after re-lining.

No. 5 Blast Furnace

Prior to the lighting-up ceremony about 60 tons of timber was placed in the bottom of the furnace after which coke and a little limestone were charged to the height of the top of the bosh. The remainder of the furnace was then charged with a light burden containing mostly coke with some iron ore and limestone.

The actual lighting up of the furnace was achieved by the insertion of a torch through No. 4 tuyere to ignite the kindling wood in the furnace. After the initial lighting the wood was ignited through the remaining 23 tuyeres around the furnace.

About 20,000 cu. ft/min of air from the turbo blower was then turned on at about 2 lb pressure, the volume of air gradually increasing until after about 13-14 days the normal operating volume of about 90,000 cu. ft/min was obtained.

It is expected that the first slag will be run off the furnace about 25-30 hours after the light-up and that the first iron will be tapped after about 30-36 hours.

SURVEY OF EXHIBITIONS

The following are brief reports of three exhibitions—the Mining Machinery Exhibition, the Foundry Exhibition, and the Engineering, Marine, Welding and Nuclear Energy Exhibition

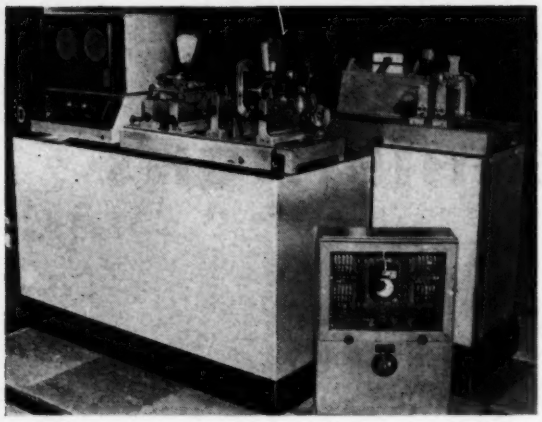
ENGINEERING, MARINE, WELDING AND NUCLEAR ENERGY EXHIBITION—Part 2

Marine Applications

On the marine side there was a constant tension winch which had been developed for vessels sailing in the Canadian Great Lakes and on the St. Lawrence Seaway, where large ships must negotiate locks and canals without the help of tugs, and must stock frequently with the minimum of expenditure and manpower. The requirements for such conditions are an ability to hold constant tension indefinitely, to pay out rapidly, and recover slack wire equally rapidly, provision for automatic absorption of shocks, and a slipping clutch adjustable to slip at predetermined strains. Such a winch was shown by Laurence Scott and Electro Motors, Ltd., and it is also suitable for ice-breakers where the holding of tension far exceeds the normal pull and the preset length of tail must be maintained without incurring the danger that a sagging rope may foul the propellors, or be cut by ice. Reduction in sea-water pollution may result from the development by Comet Pump & Engineering Co., Ltd., of positive action pump capable of delivering oily ballast water from ships' bilges to the separators in a condition in which they can handle it, i.e. without any breaking up of the oil globules. If these globules are broken up by the bilge pumps into particles of less than 8/1,000 in dia, i.e. 0·008 in, the centrifugal pumps cannot extract it, and it is deposited in the sea, thereby causing pollution on our coasts. An example of such a pump was seen on the Comet stand. It comprised of 1½-in pump with 4 per cent nickel chrome molybdenum spindle, bore-race mounted, hardened and ground, flexibox seal, tandem drive through ESRI gearbox from a 1-h.p. motor, giving a pump speed of 103 r.p.m. It can be used either as an auxiliary, or separately, for direct coupling to the crankshaft of the engine. As a genuinely slow-revving and positive action pump, the performance graph of which is a straight line, it is ideally suitable for this type of application, and is stated by the makers to be one of the only two pumps in England suitable for this operation. Another exhibit for use in the marine engineering field was a new hydraulic steering unit, developed by Keelavite Hydraulics, Ltd., for use in almost any small vessel, and suitable either for conversion or for new building. Power for the steering unit is supplied from a Keelavite gear-type hydraulic pump, which may be driven from the main entrance or from some existing drive, or be powered by an entirely separate motor. The unit is compact, and consists fundamentally of a hydraulic cylinder with an integral control valve. The cylinder is operated on the compound connection principle, pressure is maintained continuously on the smaller or analous area, while the larger full-bore area is connected either to the pressure source, or to the reservoir. When pressure is applied to both the analous area and the full area, the cylinder rod is forced outward. When the bore area is connected to the reservoir the rod moves inward. This arrangement permits the valve mechanism to be reduced to its most simple and efficient form, since it only has to allow oil to flow in or out of one side of the cylinder. The presence of pressurized oil on both sides of the cylinder also serves to eliminate any slack, and gives instantaneous response throughout the cylinder travel. The valve which is integral with the cylinder is a development of the Keelavite directional control valve. The hydraulic cylinder is of a standard Keelavite pattern. Combined into a hydraulic steering unit, the two produce a neat compact and workmanlike equipment.

On the stand of E. Green & Son, Ltd., many visitors saw for the first time the construction of the 'Tanker Heat' heat exchanger, which has been in use for many years, but is now for the first time being manufactured by Green & Son, and other manufacturers in this country and in Europe. Known as the Green Companies, these manufacturers will produce standard tanker heat elements based on Cassing Heini patent.

The 'Tanker Heat' elements comprise a steel inner tube, entirely covered with gild cast-iron sleeves. The steel tube provides the mechanical strength and flexibility, and the cast-iron padding has the important property of providing



A section of the stand of W. & T. Avery Ltd.

complete protection against corrosion. The increased heat transmitting surface due to the cast-iron sleeving also promotes a free flow of the heated liquid, and makes the system an efficient and economical means of heating liquids, and storage tanks and bunkers containing oil, mollasses, treacle, fats and other liquified solids, both in ships and in shore-based installations. In the ships the 'Tanker Heat' elements were installed near the bottom of the tanks to form a heating grid, and may be ranged in series or in parallel, or in a combination of both, to give the best results. The elements are supported and anchored in such a way as to allow free expansion and flexibility during direction. The heat transfer rate is high in proportion to first, cost, to weight and to the area occupied by the element, and it seems that the arrangement might well be extended to many other uses. It was shown on the stand by standard elements connected to copper tubing, and also by diagramatic representations of a typical installation aboard ship.

General-Purpose Industrial Mechanical Handling Equipment

General-purpose equipment was not in general well represented. One firm, Coventry Climax, exhibited fork lift trucks. Pole & Co., of Burry Port showed a stacker, a drum-storage unit, and an hydraulic barrel-stacker. The quick-lift hand-operated stacker is a portable unit handling a maximum load of 1 cwt. It incorporates a winch that is self-sustaining at all heights, neither brake nor ratchet-pawl mechanism being necessary. The rate of lift is noticeably higher than in machines using the normal type of winch, and it is appreciated that the load cannot run away when lowering. It is raised by wire pilot pulleys on needle bearings, and carriage rollers with roller bearings. The standard platform size is 21 in long by 20 in wide, but the makers say that larger platforms are available. In the model illustrated the maximum lift was 7 ft, and two 8-in dia wheels were fitted for travelling. Another version for use on uneven floor-surfaces has two small front wheels and two rear wheels in swivel castors. Alternatively, the wheels can be omitted if it is intended to use the stacker as a stacking tool. Ranges of lift heights between 4 and 10 ft can be supplied. The barrel stacker was the 'Bertolifter' hydraulically operated unit that has already been noticed in mechanical handling. With a capacity of 700 lb at 18-in load centre, it will hold 40-50 gal drums of standard size. The lift is 56 or 70 in from ground level, the front wheels are 4-in dia cast-iron mounted on roller bearings, and swivelling castors with 5-in cast-iron wheels fitted. A new device for inside or outside use is the drum storage unit, DSU/RS3 which is constructed throughout from rectangular section hollow steel tubing in which there are no crevices for containing moisture. Each unit carries three drums of 40-50 gal capacity and is handled by means of a fork lift truck. The fork clearance allowance being $2\frac{3}{4}$ in depth. Although strong enough to permit tiering loaded drums four high, each unit is light enough to be carried by one man. The units are symmetrical and reversible, and can be stacked in the minimum possible space.

W. & E. Moore, Ltd., showed a lightweight tubular mobile gantry, mounted on four ball bearings swivel castors, and roller bearing wheels. The model demonstrated had a capacity of 1 ton, but the range is from 5 cwt to 5 ton. The automatic grab with which mounted on the gantry, could be used for applications of up to 25 ton capacity. There was also a sheet metal grab of low head room, which was fully adjustable and would take thin steel sheets ranging in size from $\frac{1}{4}$ in to 15 in, with a maximum capacity of 5 ton. Total overall thickness of sheet could be as little as $\frac{1}{8}$ in, and this equipment will prove to be very useful in sheet metal stores.

The third equipment shown by W. & E. Moore was the drum grab with locking clamps. For handling drums having detachable rimmed lids, this new type of drum has hitherto been difficult to handle, but it was demonstrated that the blocking clamps on the new grab can be used to pick it up repeatedly with complete safety. Two new chain blocks were shown by Felco Hoists. At one end of the scale was the Baby 60 electric chain block, a portable unit of modern design, which is extremely light in weight, and compact in form. The top hook suspension enables it to be fitted to existing runway trolleys, girder clamps, or swing-jib cranes. The hoisting motor of the Baby 60 is of tapered stator and rotor design with a sliding rotor. The brake is operated by the sliding rotor of the motor, which together with the brake disc and liner all move in an axle direction automatically applying the brake on release of the push-button, and also, if the current is switched off in the event of a power failure. The brake is safe and reliable under all conditions, and very simple to adjust. Control is by pendant push-button, the quick-brake switch ensures positive action. Gearing is by spur gears machine-cut from the solid and fitted precision ball bearings, they run in an oil bath, and need no lubrication. Over-travel limits which is fitted for both hoisting and lowering motions; when the load hook reaches the ultimate positions the operation of the switches is instantaneous. The chain is of alloy steel and is flexible in all directions, and as distinct from roller chains, more reliable, more efficient, and less susceptible to damage. Chain boxes for unused lengths can be supplied as an extra. Current supply is on 400-440 V 3-phase 50-cycle A.C. or 350-380 V 3-phase 50-cycle A.C. Lifting capacity is 5 cwt to 10 cwt on one or two falls with hoisting speeds of 22 or 11 ft/min. The motor is of $\frac{1}{4}$ h.p. and the weight of the block with the chain suitable for a 10 ft lift is 70 lb on the 5 cwt model, and 79 lb for the 10 cwt model. Headroom is 18 in on the smaller model and 22 in on the 10-cwt unit. Of even more recent development Felco showed a hand-pulled chain block with a lifting capacity of 20 tons. It had a double head, and occupied 55 in of headroom, and its overall weight was $8\frac{3}{4}$ cwt.

Extending the Tirfor range was the T.35 unit with a lifting capacity of 3 ton and a pulling capacity of 5 ton. This pulling/lifting equipment weighs 59 lb and has overall dimensions of $28\frac{1}{4} \times 12\frac{1}{2} \times 5\frac{1}{2}$ in. With a mechanical advantage of 85 to 1 it provides two-speed operation at 3 ft/min and 9 ft/min. Standard equipment includes 30 ft of wire rope, an open socket, and reeler.

James Neill & Co. (Sheffield), Ltd., showed a new version of their 'Eclipse Magnetic Positioner'. This has a V-clamp for holding cylindrical objects, and a flat magnetized bar for resting on flat surfaces. A combination of these two magnetized units enables composite constructions to be held in any related positions.

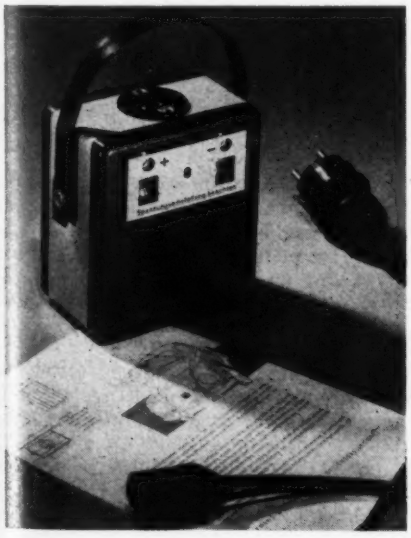
Handling operations in the barrel finishing line are facilitated by Fox Chemical Engineering Works, Ltd., 'Polymotion' D.U.S. barrelling machine, which incorporates a mechanical separator.

Two electrically driven cargo-winches of their latest design and a steam automatic mooring winch were full-size features on the stand of Clarke, Chapman & Co., Ltd. In addition to these full size exhibits models of dock and engine-room auxiliaries were shown and included one of the company's electrically driven level luffing deck-cranes, and an anchor cable and warping capstan gears fitted to large tankers. One of the new cargo winches is a self-contained Ward-Leonard winch for A.C. supply.

After the barrelling process has been completed the load is tipped into a p.v.c. lined hopper, and the separator is started up. The outlet from the hopper is controlled by a flap actuated by a hand wheel in front of the machine which enables a continuous flow of medium parts to be ejected on to the screen. With this machine the usual transfer by hand hoist is cut-out, and barrelling and separating are performed as one operation in one machine with consequent saving in floor space. Separating after barrelling is sometimes made more difficult by the incongruous shapes of the work. The 'Finesse' chips manufactured by Fox produce a better surface finish and an addition facilitates separation when used in conjunction with polymotion machine, they afford a contribution towards ease of separation and handling.

On the degreaser line Fox offer a new 'Perfix' SA 1 degreaser combining two stages in one compartment, with the fully automatic process cycle from the lowering of the barrel into the compartment to the lifting of the parts out again in the barrel. The interlocked lid makes it impossible for the operator to remove parts before they are properly degreased and dried and avoids any danger of drag out of the solvent, thus saving perchloroethylene. The barrel can be used for all cup-shaped parts and for those with recesses which otherwise would retain liquid solvent. The same machine is also made without the barrel, either for big parts, or for parts contained in baskets. These are first subjected to hot spray which stops after a preset time, and then to a vapour spray finishing process.

Battery Charger (Siemens-Schuckert (G.B.) Ltd).



Shown picking up a car pressing as it emerged from the power press position and depositing it in another given position for return to the machines for a repeat operation, was a working exhibit on the stand of Maxam Power, Ltd. This was their fully automatic draw-type extractor controlled by Maxan cylinders and valves, and manufactured by J. Simpson & Son (Engineers), Ltd., Luton, for use at the rear of power presses to extract pressings from dyes, moulds, etc. The movements of the jaw and carriage and the extraction of timing sequences are operated and controlled by the Maxan cylinders and valves which are controllable within fine limits to produce a number of extraction and unloading movements, and the extractor may be mounted in a variety of ways to suit the user's requirements. The draw-type extractor functions with the aid of three double-acting air cylinders and associated control valves which operate the draw, the vertical movements of the arm, and the horizontal movements of the main carriage. A Maxan timing reservoir controls the extraction and release sequences, and determines separate movements of the jaw during each cycle.

On the typical operational sequence the press ram moves upwards on completing a pressing, and trips a micro-switch energizing one of the Maxan solenoid valves. This valve operates and passes compressed air to 2¼-in air cylinder mounted behind the jaw unit. The cylinder moves the jaw unit for 6 in causing the jaw to grip the pressing to be extracted. A second 2¼-in air cylinder mounted and controlled by the timing device operates lifting the jaw unit and pressing clear of the dye. A 3-in bore, 22-in stroke air cylinder mounted in the main carriage then comes into operation and moves the jaw unit outward from the press. The completion of the outward stroke, the main carriage operates a second micro-switch which de-energizes the solenoid valve jaw controlling cylinder to retract and release the pressing at a selected position ready for movement to next pressing to the assembly shop. The main carriage cylinder then returns the jaw unit to its original position, and the vertical arm is lowered ready to repeat the sequence.

This A.C. winch is a completely self-contained unit, the whole of the electrical equipment being housed in the bedplate and controller pedestal, and it gives a performance comparable with that obtained from a normal D.C. winch. All that is necessary on installation is to couple the mains, direct the winch, and the inter-connections between the winch and the controller pedestal which is shunt cables only. The wire and the stator core of the motor is removable as a unit for repair or replacement.

This winch has a handling capacity of 3 tons at a speed of 100 ft/min, or 1½ tons at 200 ft/min, and the light hook can be used at a speed of 250 ft/min. No footbrake is fitted, and two winches can be remotely controlled by one operator. On first step lower the winch automatically stops when the load touches down. It also stops automatically in the event of a current failure. When heavy loads are lowered power is regenerated into the ship's supply system, thus reducing the overall loading on the generators, and no alteration is necessary in the electrical system for undertaking heavy derrick work.

The other new winch is a contactor type cargo winch driven from a direct current supply. It is supplied in four forms, firstly as a self-contained unit with contactor gear and controller mounted on the winch, secondly with contactor gear on the winch and controller mounted separately, thirdly with contactor gear in a deck-house and the controller on the winch, and fourthly with contactor gear in the deck-house and a separate controller. It will handle loads of 3 tons at 100 ft/min, 1½ tons at 200 ft/min, and light loads at 450 ft/min.

Thirdly there was an automatic steam mooring winch which was shown last year in model form. With a 12-in dia cylinder and 14-in stroke it is capable, in double purchase gear, of handling 40,000 lb at a speed of 100 ft/min or a slag-rope at 200 ft/min. In single purchase gear it handles 16,000 lb at 280 ft/min, or 560 ft/min with a slag rope. The winch is hand-controlled and operates on a working steam pressure of 150 lb/sq. in. When operating in single purchase gear with a barrel brake released, the steam valve fully opened, and the control lever in the heave end position the action of the winch is entirely automatic. If the strain of the mooring wire falls below 16,000 lb the winch will automatically wind in and maintain a minimum strain of slightly in excess of 16,000 lb. If the strain goes up it will be held by the winch to a maximum of about 60,000 lb. Should the strain exceed this figure the winch will render back or pay out, and thus prevent any further increase in the strain and protect the mooring wire against breakage.

New Level-luffing Deck Crane

Last year Clarke Chapman announced that they intended to resume the manufacture of deck-cranes. At the exhibition a 1/12 scale model of a new electrically driven level luffing deck crane was shown. It was of a standard fixed type, the crane being mounted on a centre post, which was carried down and anchored between the deck levels. Ward Leonard control was fitted on all motions, giving minimum line surge and a wide range of speeds, particular attention being paid to ease of operation and clear visibility from the driving position.

High Efficiency Screening

A major break-through has been achieved by Russell Constructions, Ltd., with their 36-in invector screen. Employing their principle of gyratory turbulence the manufacturers have succeeded in attaining maximum gyratory effect with minimum centrifugal force. A vibrational effect of 2,800 vibrations a minute has been imparted to the 36-in dia screen in a machine powered by a ½-h.p. electric motor. Sieving and straining effects have been greatly increased in the new product, and enable raw juice to be strained through a 60 mesh screen at a rate of 20,000 gal/hr. Pottery slip can be sieved through a 100 mesh at a rate of 800 lb/hr. This thick creamy substance was previously impossible to strain without first being diluted. It will handle greasy clogging dry materials that hitherto have been impossible to screen and will produce very much better effects on materials such as, for example, zinc oxide, which with the old type of sieve could be strained at the rate of 300 lb/hr at a speed of 1,400 r.p.m. and with the new invector screen at a rate of 1,000 lb/hr on the 22-in dia screen moving at a speed of 2,800 r.p.m., and it is estimated that with the 36-in screen the output rate will be raised to 2,000 lb/hr. Another property possessed by this screen is the capacity to granulate continuously metal powders for tungsten tip tools high-speed alloys, and other engineering products. Two standard screen sizes are at present available, the 22-in dia revolving at a speed of 1,400 r.p.m. and the 36-in dia screen revolving at 2,800 r.p.m.

Pumps

Pumps were exceptionally well represented at this year's Engineering & Marine Exhibition. Mention has already been made of the comet pump and its value in avoiding the breakup of oil globules in bilge. water. On their stand this company showed a number of working models of positive action and totally reversible pumps dealing with all manner of liquids, and solids, such as wood bark and grain, semi-solids such as liquorice, clay, cotton, waste, wood-pulp and rubber. They also showed their new Series CL liner pump. This is a new version of the comet pump with solid vein and daredevil bearing arrangements, in which improvements have been made to facilitate maintenance. One of these modifications is the recess provided on the facing for locating the cover. Another improvement is the location of the sealed ball race in its own housing which enables race and housing to be removed for renewal or repair as a single unit.

In the new Tangye 'Hydraflo' pump oil hydraulic power is used to reciprocate the plunger and replace the conventional system of gears, crankshafts, and connecting rods. This is a high-pressure pump capable of outputs of 1,000 gal/hr at pressures of 1,500 lb/sq. in. or 5,500 gal/hr at 3,000 lb/sq. in. and was developed for the National Coal Board for the infusion of coal seams. It has however, many other potential applications, and the manufacturers envisage the attainment of higher pressures and greater quantities, for example, pressures up to 6,000 lb/sq. in., output up to 3,600 gal/hr and powers up to 50 b.h.p. in their future development. Initial motor power is provided by a normal 1,450 r.p.m. induction motor, and a large diameter piston operating at slow speed requires fewer cycles per unit of volume pumped than that needed in the normal type of short-stroke multiple piston high-speed crank-driven pumps, with a consequent reduction in the rate of wear on seals and valves. The piston speed of the Tangye pump is of constant velocity over a complete cycle giving an almost straight line output. Overall measurements are 5 ft 2 in long, 2 ft 2 in wide, and 3 ft 2 in high, and the gross weight of the unit, including electric motor and a supply of oil, is 25 cwt.

Hamworthy showed a screw pump for the handling of viscous liquids in which the bearings are carried outside the main pump casing and the grease lubricated. Fluid is drawn from each end of the pump, and the screws are in hydraulic balance with the elimination of axial thrust. The design of the screws ensures a non-pulsating, non-turbulent discharge. Capacity range is from 3-1,500 gal/min for working pressures of up to 350 lb/sq. in.

For those industrial applications where it is necessary to maintain pressure with no flow and without overheating of the oil the A.V.D. model of the H.P. rotary oil pump is of special value. This pump gives the full output of oil until a given pressure is reached. The initial compression being variable by means of a hand-wheel. If the outlet from the pump is completely shut the pump ceases to deliver, and the volume of oil pumped is only that required to make good any leakage within or without the unit. This leakage is very small and the pump may be said to be idling at full pressure. Any tendency for the pump to heat up when idling at full pressure is prevented by the provision of a cooling circulation of oil throughout the casing, which enables the unit to run in this condition for indefinite periods. The action of the rotating parts of the pump causes oil to be drawn through the suction port in the pump casing, and deflect the revolving oil from the casing back into the tank, thus setting up a continuous circulation of oil at low pressure, which keeps the whole unit cool. When the pump is delivering pressure oil, and the necessity for cooling no longer exists this circulation is reduced.

A very special-purpose pump was shown by Mono Pumps, Ltd. It was developed in collaboration with a team of surgeons for pumping human blood with minimum damage to the red corpuscles. The pumping unit can be alter clave as a single cartridge, and the unit has therefore possible applications to research work or to use in pilot plants, where liquids may be easily damaged, and where special hygiene requirements are involved.

Another mining application was shown by Goodyear Pumps, Ltd., with their new mining pump set for face drainage. It comprises a Goodyear A12 positive displacement pump directly coupled to a 1,440 r.p.m. English Electric 7½-h.p. totally enclosed fan-cooled flameproof motor mounted on a skid base. The pump has a constant delivery rate of 75 gal/min with a head of up to 200 ft, and a

suction lift of up to 28 ft. It is driven through a flexible coupling from the electric motor shaft. The unit is 4 ft 4 in long, 2 ft 6 in high, without relief valves, and 1 ft 10 in wide, and weighs approximately 625 lb. Flanges can be arranged for either 2½ in or 3 in dia suction and delivery piping. This running set was one of the exhibits featuring the Goodyear positive displacement rubber to metal self-priming pump, which is a fairly recent development, and is available in all sizes in bronze and aluminium. Stainless steel pumps are now in production and will be available this summer.

Two new pumps were shown by British Labour Pump Co., Ltd., the MSZ horizontal flooded suction centrifugal single-stage process pump which is designed to handle hot liquids at outputs of up to 1,000 gal/min and heads up to 300 ft, and the DSZ direct mounting horizontal centrifugal pump which deals with all types of liquors and slurries at the rate of 450 gal/min and with heads of up to 200 ft. The German firm, J.S.B. Manufacturing Co., of Frankenthal, showed several pumps of special applications. These included their multi-stage boiler feed pumps developed for very high pressures and temperatures which can operate at up to 5,800 lb/sq. in. and at temperatures of up to 310 deg C. They also had the glandless circulating pump operating at suction pressures of up to 3,600 lb/sq. in. with capacities of up to 10,000 gal/min and heads up to 400 ft, and the horizontal and process and chemical pumps with vertically arranged canned motors with pressures up to 5,700 lb/sq. in. and can sustain temperatures up to 400 deg C.

As at the previous exhibition valves were well represented. The advent of nuclear engineering and with it a whole new range of toxic corrosive and radio-active liquids and gases has given a new impetus to the development of diaphragm valves for industrial use. One of the pioneer firms in this field is the Saunders Valve Co., Ltd., of Cwm Bran, whose output of diaphragm valves has greatly increased during recent years. On their stand they showed their new 214 grade diaphragm made of polytetrafluoroethylene which is exceptionally resistant to chemical attack, and can withstand normal vacuum conditions, or a working pressure of 100 lb/sq. in.

High-Powered Weight Ratio Diesel Engine

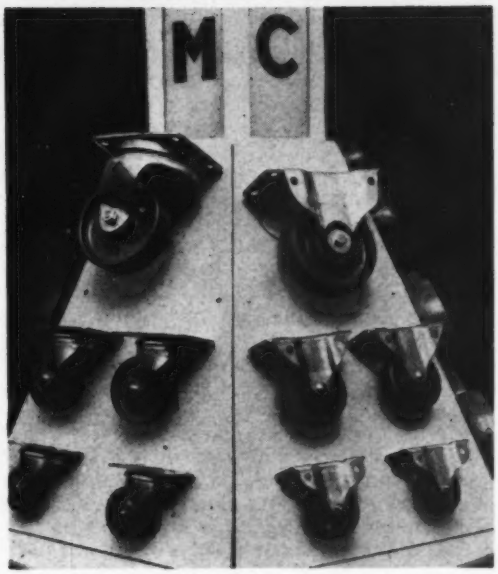
Great interest was shown in the Elstree diesel engine developed by S. E. Opperman, Ltd., for operating on diesel oil, petrol, paraffin or TVO without modification. With one cylinder, direct air cooling of 3-in bore and 4-in stroke, this unit has an exceptionally high power weight ratio. Complete with a 25-lb fly-wheel it weighs 85 lb and the industrial unit as exhibited, with fan, cowling silencer, and starting handle, tank, air-filter, and other equipment weighed 110 lb. The power output of this unit ranges from 3 b.h.p. at 1,200 r.p.m. to 12 b.h.p. at 3,500 r.p.m. For alto motor views the engine has a useful speed range of 350 r.p.m. to 5,000 r.p.m. and a maximum power output of 17·5 b.h.p. Its weight, complete with fan, cowlings and fly-wheel is 90 lb. The alternative fuels can be used without any modification other than the addition of a small quantity of lubricating oil to petrol and paraffin to assist the operation of the fuel injection equipment.

Engineering and Marine

Opperman Gears, Ltd., perhaps better known as Oppermans of Newbury, displayed horizontal foot-mounted geared motors from fractional to 60 h.p., and vertical flange-mounted geared motors of up to 25 h.p. with single-reduction worm gears, also co-axial speed reducers both helical and spur of up to 60 h.p., single-reduction worm-type speed reducers of up to 120 h.p. and double-reduction worm reducers with output torques of 100,000 lb/in.

Transmission Gear

Opperman Gears, Ltd., also showed a new range of speed reducers, and Crofts, of Bradford, exhibited two new types of universal mounting gear units and a new type of flexible resilient coupling. The simplified universal design covers worm gears of the standard inverted and vertical types, and up to 15 mounting positions and different arrangements of input and output shafts are made available. The universal helical gear unit will be available in a wide range of ratios up to 500 h.p. output.



A selection of castors shown by H.M.C. Wheels Ltd.

Siemens-Schuckertwerke showed a brake motor of new design which has been developed for crane operation and machine tool applications. This brake rotor operates to safety when the motor is switched off, or when the power supply fails. The brake is lifted when a ring magnet is electrically excited, or by hand in the switched-off position. The motor shaft remains in position without axial movement during brake operations, which are carried out by means of springs, pressure on which can be changed to suit requirements. Among the transmission unit shown by Self-Changing Gears, Ltd., for industrial purposes, was an exploded model of a fluid friction clutch. This unit combines the features of the fluid and the centrifugal coupling. The fluid coupling providing a smooth take-up from rest, while the centrifugal element ensures a positive grip of the friction member at high speeds, although the moving parts used are comparatively light. The combined unit takes up no more space than the normal fluid coupling. An exploded model was shown also of the Schneider single-stage torque convertor made under licence in this country by Self-Changing Gears, Ltd. Pump, turbine and reaction membrane in this unit are single aluminium castings, with blades or veins which direct the flow of oil in the hydrokinetic system. Also demonstrated was a range of electronic recording equipment which provide the engineer with means of accurately recording such phenomena as pressure build-up in a cylinder strain on a brake-band torque in a shaft.

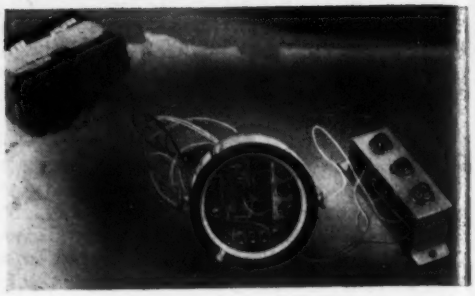
Hydraulics and Pneumatics

Joseph Lucas showed three new units in their range of piston pumps and motors. These gave outputs of 125 gal/hr at 1,000 r.p.m., 500 gal/hr at 1,000 r.p.m., and 1,000 gal/hr at 1,000 r.p.m. They also showed a model of a tractor equipped with hydrostatic transmission. In a working

demonstration this small model tractor was made to simulate the infinitely variable drive that can be obtained hydraulically with the actual full-scale tractor installation. By manipulating a single control lever which varied the camp-rate angle, and hence the stroke of the pump plungers on the display model, the smooth operation of the drive to the rear wheels of the tractor over an infinitely variable range from maximum forward speed to maximum reverse was demonstrated. On the actual full-scale installations, Lucas point out that a large-capacity pump would be driven off the tractor engine and piped to individual motors attached to the tractor wheels, either directly or through gearing. The high-pressure fluid could also be used for accessory drives apart from the main duty, and, in general, the weight of one pump used as a central source of high-pressure fluid would be less than the equivalent system using separate small pumps.

Keelavite showed their range of GP series gear pumps with displacements up to 30 gal/min at 1,000 r.p.m. and pressures up to 3,000 lb/sq. in. Tangyes, Ltd., showed two new models extending the range of their 'Hydralite' jacks. These are models 1835 with a capacity of 35 tons and a power lift of 18 in, and 6100 with a capacity of 100 tons and a lift of 6 in. The 100-ton model embodies many additional features desirable in a jack of this capacity, including the two-speed pump which can be changed from low pressure to high pressure with a push button. The pump is easily removed, and by means of a single connecting pipe the unit can be used as a detached jack.

Among three new units on the stand of Industrial Hydraulics, Ltd., was the 'Keelatite' coupling, which is being developed to meet the requirements of high-pressure hydraulic installation work. The tube end of this coupling is formed to an accurate shape by oil pressure generated by means of a small hand-operated or powered pump. It can be used with any of the usual metal tubes, and it is available to suit a wide range of fluids, and operating conditions. Since no weakening of the tubes takes place, thinner walls may be used. No machining is necessary, and heat is not required, thus removing the danger of scale formation, and explosive atmosphere hazards. Also shown for the first time was their liquid-sealed hydraulic accumulator which is made in a capacity range of 1, 2, 4, 6 and 8 gal/min, and larger sizes are promised shortly. The third item was a new micro-filter which is currently available in six gal/min capacities suitable for use in hydraulic circuits at pressures up to 1,500 lb/sq. in.



Pulse generator working from 4½ volts (Cass & Phillip, Ltd.

In the pneumatic section, Sir George Godfrey & Partners (Industrial), Ltd., showed the latest model of their roots-type machine, the L/675. As a blower, this machine will deliver 520 cu. ft. of air at pressures up to 15 lb/sq. in. which makes it well suited to the pneumatic conveying of powders and granular materials. It was shown complete with a filter and silencer.

Control Equipment

A remote-control actuator of extraordinary accuracy was shown on the stand of Hydraulics & Pneumatics, Ltd., who are acting as the sales subsidiary of the manufacturers, Turner Manufacturing Co., Ltd.

SURVEY OF EXHIBITIONS

FOUNDRY EXHIBITION

With 97 exhibitors showing material worth over £1,000,000, the Foundry Exhibition sponsored by the Foundry Trades Equipment and Supplies Association in Bingley Hall, Birmingham, was the largest display of supplies, plant and equipment used in the foundry industry ever to be staged in this country.

There had been only two previous national exhibitions of a similar nature, both held in the early twenties. Since then, the foundry suppliers' industry has had the choice of exhibiting at shows like the B.I.F. or as a section of the Engineering and Marine Exhibition. It had been felt for some time that a separate specialized exhibition, dealing with those subjects of interest to the foundryman only, was needed, and the Bingley Hall display, which was opened on May 21st by Sir Frederick Scopes, chairman of the Stanton Ironworks Co., and ran for 10 days, was an effort to meet that need.

In a message to the exhibition, Mr. Gavin C. Paterson, President of the Association and a director of Paterson Hughes Engineering Co., said: 'To-day, more than ever before, the foundry industry is faced with the necessity of reducing costs and at the same time maintaining the high quality of its products. It is more than ever essential, therefore, for the foundryman to keep abreast of developments and I believe this specialized exhibition will succeed in making it easier for him to do so.

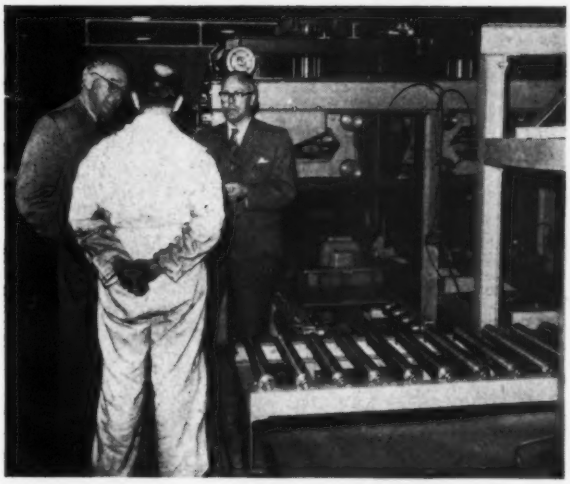
'Exhibitions of this nature encourage discussion and good relations between manufacturer, supplier and user.

Only by such close co-operation can progress in design, operating technique and the use of materials be maintained and stimulated'.

The success of the exhibition surprised even its organizers. Within the first three days of its opening it had attracted visitors from 18 overseas countries, including India, Pakistan, Sweden, Finland, Spain, Czecho-Slovakia and the Argentine. Some placed orders and many more made firm inquiries, going to the length of making drawings of what they wanted. The interest shown by the Scandinavian visitors was perhaps particularly significant in that on the day the exhibition opened there was a conference in Birmingham between Midland industrialists and trade representatives from the four Scandinavian countries to discuss a British trade drive to the Nordic area.

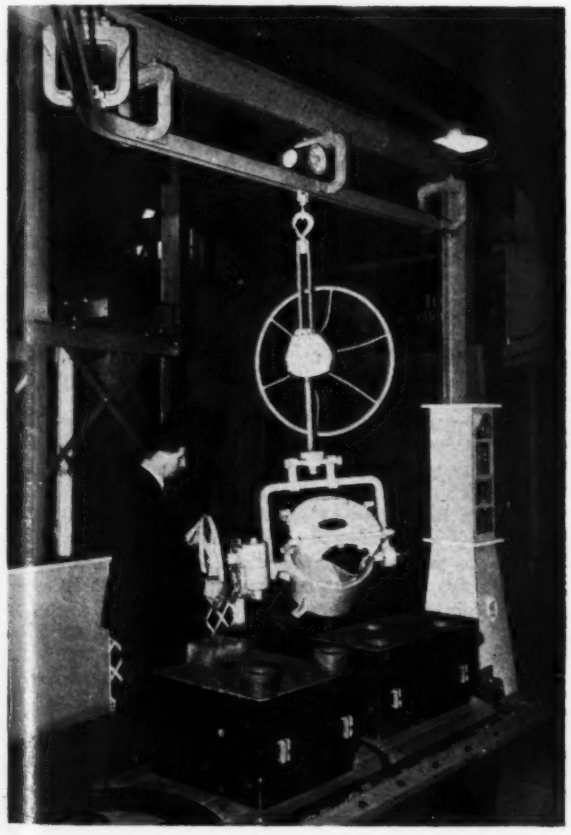
One of the highlights of the display was the Hallsworth automatic moulding machine, Mark II, which Rubery Owen were showing to the world for the first time. It has been designed to appeal to a section of the industry which has so far not been catered for by any real advance in mechanization. It is a new approach to the old problem of producing medium or large quantities of accurate ferrous and non-ferrous sand castings of a size that might be accommodated in an assembled moulding box of, say, 12 × 9 × 5 in. In a conventional foundry it would be customary to use a larger box than this, moulded by hand, with, possibly, machine squeezing and stripping, followed by hand assembly and pouring under simple factory conditions which have not changed in many decades.

In direct contrast, the Hallsworth automatic moulding system employs the principle of using relatively small, easily handled moulding boxes with completely automatic equipment as and where necessary but still retaining the human element when justified by economics. At the same time, the system has been designed as flexible as possible to facilitate the use of a number of pattern plates within a single shift, without any more modifications than can be undertaken by a semi-skilled mechanic.



The automatic mould closing machine. (*Floodgate Steel Fabricators*)

The Paterson Hughes pallet-type mould conveyor with the twin-bar runway. (*Paterson Hughes Engineering Co., Ltd.*)

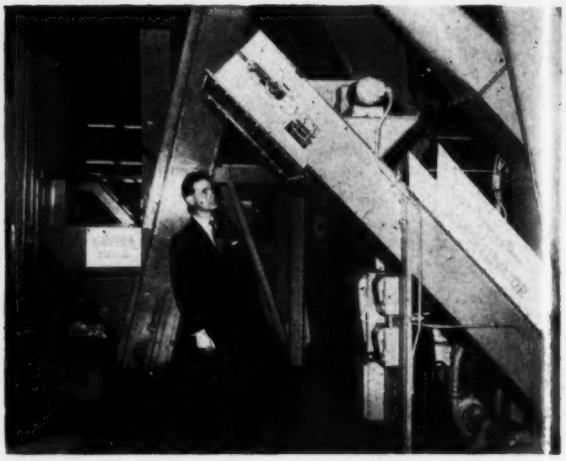


A number of machines had been operating in initial installations for some time and the Mark II on show at Birmingham was the result of considerable experience. It is capable of producing at least 480 half-moulds an hour. Briefly, the machine is based on machine tool construction principles and comprises a strong rigid frame to which are attached the mechanisms for carrying out the different functions. The moulding table rotates between the base and head castings which, in principle, from the structural viewpoint, present a self-contained force system somewhat like a normal machine shop press. Basically, the control and actuation system is simple and complex electronic systems have been avoided. The complete plant, which has an underground sand conveyor, can be accommodated on a concrete apron of about 30 × 60 ft, and the output of 240 completed moulds an hour is obtained with a five-man team.

The fact that Acme have just completed an agreement with the Ajax Company of America for the manufacture of the Ajax vibrating conveyor was reflected in a large working model of an Ajax plant at the Acme stand. Another model was of the Bartlett-Snow mould conveyor, which Acme also manufacture under licence. One which Acme have recently installed in the Ford Thames-side factory is the longest in Europe. Acme had also on view a pneumatic conveying system embodying new ideas about dust extraction. Capable of handling up to 20 tons of silica an hour, it is designed primarily for foundries, but can be used with any other type of shop, and in places where any other type of conveyor would be impracticable.

The theme of the Floodgate Steel Fabricating Co.'s exhibit was the demonstration of automatic closing of cope and drag moulding boxes as applied to medium and heavy machine moulding systems. The machine exhibited was the Floodgate patent medium automatic closing machine, dealing with 19 × 17 × 8 in deep moulding boxes, the total weight of the complete rammed and cored cope and drag being about 500 lb. One interesting feature is that there is a core projection in the cope moulding box. All manual lifting and closing of boxes is eliminated and there is

View of August's, Ltd., stand



Ajax vibrating conveyor on the stand of Acme Conveyors, Ltd.

'Rapid' circular lifting magnet, for heavy-duty service in steel works, blast-furnace plants, open hearth steel plants, iron and steel foundries, scrap yards, etc., shown at the Foundry Exhibition. (Rapid Magnetic Machines, Ltd.)

unobstructed run-through of boxes for return roller tracks to moulding machine and coring up tracks to final closing and transfer to mould conveyor. There are independent coring up tracks for cope and drag, and the balanced design of the machine allows two closing and transfer operations to take place simultaneously.

Either manual or automatic feed is possible, and the machine is capable of closing and transferring 120 moulding boxes an hour.

Catching the eye on the Paterson Hughes stand was a new twin-bar pouring runway of which an outstanding characteristic was the extreme ease of movement of the ladle. Another new product was a totally enclosed two-speed electric hoist block. More compact than anything seen before, it is particularly suitable for foundry work. While its usefulness is obvious in such jobs as parting and closing moulds, it can be adapted for any other lifting job in the foundry. Also on view was a 5-ton grab crane as an example of the kind of thing Paterson Hughes design expressly for the foundryman, all with the object of taking the muscle out of handling.

Mull-mixers designed originally for use in the company's own foundries and Thorite motorized conveyor drums appeared as a working exhibit on the Richards Structural Steel Co.'s exhibit. This was designed to show, under full working conditions, a 6-ft diameter batch-type mull-mixer with a capacity of up to 15 tons of mulled sand an hour, fed by bucket loader and with the discharge of sand via a built-in aerator to a T. & T. works conveyor driven by a Thorite motorized conveyor drum. The main emphasis of the design of the mull-mixer—apart, of course, from satisfactory mulling—is to avoid breakdowns, and this objective is achieved by unique methods of sealing the bearings and all working parts.

The Thorite motorized drum represents a notable advance in mechanical handling. An outstanding characteristic is its compactness; it consists of a built-in motor and gearing, the whole unit sealed to prevent ingress of dirt and moisture. The fact that the motor is not a separate unit and that no worm reduction gear and chain drives are necessary means that the space occupied by conventional motors and external drives may be saved for other purposes. The working parts are lubricated by a reservoir of oil within the drum, which also acts as a coolant to the motor.

August's had on view an impressive range of plant, introducing several features new to this country. Noteworthy was the use in the National August Coolevayor of a fast-moving cleated rubber belt—instead of a bucket belt—made under licence from the National Engineering Company of Chicago. This has the advantage of breaking down lumps formed during the mixing stage and thus performing the dual function of elevator and aerator. An extension of the Elevayor principle, the National August Coolevayor is simply an elevayor with a large housing, having an arrangement for diverting a large portion of the discharge and directing it back on to the belt in such a way as to cause a "sand storm' inside the housing. Meanwhile, air is pulled through the sand to evaporate the moisture

(added, if necessary) and so cool the sand. The sand from the August-Simpson mix-muller is discharged into the boot of the elevayor which feeds a dual type moulders' hopper (or moulders' helper, as it is often called) and avoids the use of a sand distributing belt conveyor.

Working in conjunction with the Coolvayor was a National August Hydro-filter wet dust collector, new to this country. In its operation gas/air is drawn upward through a filter bed, where it is divided into thousands of small streams which support a turbulent water layer. Intimate gas-water contact ensures effective wetting and/or absorption of contaminant.

The Monocore oven shown by F. J. Ballard & Co. is a relatively new departure in the field of core drying. Unlike the usual vertical or tower dryer, this unit is of horizontal design and incorporates some interesting features. Heating can be by town or petroleum gas, oil or electricity and the system of air circulation embodies the patented Ballard reserve flow side to side circulation. The conveyor is a closed circuit monorail type, overcoming problems of localized loading and unloading.

Foundry Mechanisations (Baillot), Ltd., had their 30-ton continuous sandmill, S.B.9, on display. In this, a machine-cut spur gear and pinion replace the 'as cast' type and are driven through a vertical reduction gear coupled directly on to the motor. Lack of space prevented the firm from showing in complete form its new '5 in 1' sand facing unit, which offers a complete sand preparation cycle, with screen, magnetic extraction, automatic loading, mixing and milling and disintegrating. Four of the units, however, were to be seen.

Designed to meet the requirements of the small or jobbing foundries lacking elaborate sand conditioning plant, a 'Rapid' portable foundry separator was put on by Rapid Magnetic Machines, Ltd. It is a self-contained unit, in which a non-electric permanent pulley extracts and automatically discharges the iron content. The machine is at a convenient height for hand feeding and has a capacity far in excess of manual loading.

Dallow Lambert & Co., Ltd., were demonstrating one of the range of their 'Dustmaster' units—a machine which carried its own testimonial in the amount of dust it was extracting from the atmosphere of Bingley Hall! Special attention is paid to noise, and the use of completely automatic shaking gear ensures that the noise of discharge is reduced to a minimum. An example of water-cooler was the 'Multiswell', fitted wi.h automatic water level control.

A recent distinction achieved by the rotary electric vibrator shown by Electromagnets, Ltd., is that it has been awarded a fireproof certificate covering groups I and II gases. The model on view was one that is now coming on to the market after three years of research and experiment by the firm.

To complete the picture of mechanical handling, in foundries as elsewhere, were the industrial loaders shown by R. E. Weatherill, Ltd., and E. Boydell, Ltd.

SURVEY OF EXHIBITIONS

MINING MACHINERY EXHIBITION

by T. W. Highgate

AFTER TEN YEARS a second exhibition of mining machinery was held at Olympia, London, July 9th to July 18th. The exhibition was two years or more in the planning stage and was sponsored by the Council of Underground Machinery Manufacturers, the members of which are listed in Table 1. More than 100 stands displayed all kinds of British-made mining and allied equipment, much of it mechanical handling equipment or equipment which works with or depends for its effectiveness upon specialized handling equipment.

Much of the equipment, although specialized in its application, is of interest to mechanical handling engineers in general, and some of it may suggest ways and means of solving problems in other industries; the manufacturers exhibiting their latest models and designs, are, many of them, well-known manufacturers of general mechanical handling equipment and exhibitors at the *Mechanical Handling Exhibitions* (the next of which will be held in 1960); mining machinery is an important British export and contains a major mechanical handling component.

The gap of 10 years between consecutive exhibitions of British mining machinery is simply explained. During the period the National Coal Board has undertaken major mechanization developments and this has necessarily resulted in encouragement of intense development in the design and use of British mining machinery. However, due to the major demands for machinery by the National Coal Board, British manufacturers were for a number of years unable to fully attack export possibilities. Now, with British coalmines largely mechanized and with a change of emphasis from home to export markets, British manufacturers feel that the time has come to tell the world of their achievements and of their readiness to supply all-comers with up-to-date mining machinery.

Examples of Application

Typical examples of application underground of exhibits which were to be seen at C.U.M.M. stands at Olympia, are shown in Figs. 1, 2, 3, 4, 5, 6, 7 and 8. Fig. 1 shows the new Distington-Goodman duckbill loader at work on high-speed drivage at a colliery of the South-Western Division of the National Coal Board. Because of the very low headroom required with a duckbill loader, cleaning-up can continue simultaneously with arch setting, as can be seen in the photograph. The duckbill loader is feeding on to a shaker conveyor, similar to that shown in Fig. 2. This particular machine, also a Distington-Goodman design, is seen in this photograph, removing spoil from a rock face to a point 100 yd out-by for disposal. A third interesting Distington-Goodman machine is shown at work in Fig. 3. This is a ropebelt conveyor structure, and it is shown removing spoil

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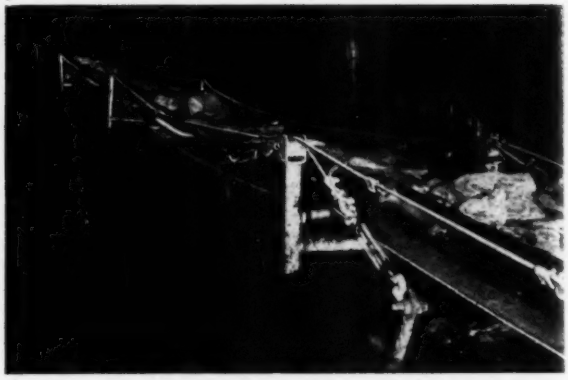


Fig. 1. The Distington-Goodman duckbill loader employed in high-speed drivage at a colliery in the South Western Division of the National Coal Board. Note how cleaning-up continues simultaneously with arch setting, drilling, etc., because of the low headroom required with the duckbill loader. It is shown feeding on to a shaker conveyor

Fig. 2. Distington-Goodman shaker conveyor removing spoil from a rock face quickly and efficiently, to a point 100 *yd or more outby for disposal*

Fig. 3. Distington-Goodman ropebelt conveyor structure removing spoil from behind a gathering arm loader. Note method of anchoring ropes by floor pokers. Where floor conditions are bad, ropes can equally well be anchored to an R.S.J. or prop, or the whole conveyor structure can be suspended from the roof.

from behind a gathering arm loader. The method of anchoring ropes by floor pokers is clearly shown. Where floor conditions are bad, the ropes would probably be anchored to an R.S.J. or a prop, or, possibly, the whole conveyor structure suspended from the roof.

The Distington-Goodman ropebelt conveyor structure was introduced to the British market last year and, instead of rigid side frames as used in conventional conveyors, employs wire ropes, referred to above. The advantage of this arrangement is increased carrying capacity, 20 per cent or so, achieved by the unusual troughing action of its chain-linked idlers. The conveyor is also only one-third the weight of orthodox conveyors. There is stated to be an increasing demand for this conveyor, both from collieries and other users of mechanical handling equipment, particularly where ease of erection and of dismantling, and compact stacking of component parts, are important requirements. *Distington-Goodman equipment is made by Distington Engineering Co., Ltd., a subsidiary of the United Steel Companies, Ltd.*

A heavy-duty gate conveyor at work underground is shown in Fig. 4. This a Meco machine, with a 36-in belt and 75-h.p. twin-drum driving head of the in-line type, having 30-in drums and a traction-type fluid coupling, with a thruster-operated brake having time lags and brake protection switches. A centrifugal sequence control unit is incorporated and there is a remote delivery unit with heavy-duty 20-in dia drums. The gate conveyor shown has a combined gravity take-up, a winch of double rope type with individual rope adjustment and gravity take-up universal weight framework.

Table 1. Members of the Council of Underground Machinery Makers*

Anderson Boyes & Co., Ltd.
British Jeffrey-Diamond, Ltd.
Consolidated Pneumatic Tool Co., Ltd.
Cowlinshaw, Walker & Co., Ltd.
Distington Engineering Co., Ltd.
Dollery & Palmer, Ltd.
Dowty Mining Equipment, Ltd.
Eimco (Great Britain), Ltd.
Gullick, Ltd.
Hardypick, Ltd.
Hayden-Nilos, Ltd.
Holman Bros., Ltd.
Austin Hopkinson & Co., Ltd.
Austin Hoy & Co., Ltd.
Joy-Sullivan, Ltd.
Mastabar Mining Equipment Co., Ltd.
Navor & Couslon, Ltd.
M. & C. Switchgear, Ltd.
Mining Engineering Co., Ltd.
N. J. Nuschamp & Co., Ltd.
Campbell Ritchie
Siemens-Schuckert (Great Britain), Ltd.
Siskol Machines, Ltd.
Richard Sutcliffe, Ltd.
Victor Products (Wallsend), Ltd.
Hugh Wood & Co., Ltd.

* A very large number of other firms exhibited at the Mining Machinery Exhibition.

Channel stringer and cover plates are used for the construction of the run of the conveyor. The troughed idlers are of cast iron, 4-in dia, 20-deg troughing angle, pressure greased, labrynth sealed. There is a single 20-in dia tension end, with a skirt plate hopper and rubber disc impact idlers.

A second Meco conveyor at work underground, is shown in Fig. 5. This has a 36-in belt, channel stringer and cover plate structure as designed for heavy-duty gate and trunk belt conveyors. Cast iron pressure-greased troughed idlers of 4 in dia are used, with outboard supports, and adjustable -in grease-packed return idlers. The structure is robust and easily assembled and can be used without cover plates. It is available in 12-ft sections. *Meco conveyors and mining machinery are made by The Mining Engineering Co., Ltd.*

Another example of modern underground conveyor practice is shown in Fig. 6. This is a roadway conveyor on an M. & C. stringer structure, built by Mavor & Coulson, Ltd. The photograph is reproduced by permission of the National Coal Board.

Details of a modern underground conveyor driving head are shown in Fig. 7, which is the photograph of a Meco driving head working a 36-in trunk conveyor. The driving head is of 100 h.p., of the twin drum type, of open design, with 30-in drums, traction-type fluid coupling and thrust or operated brake.

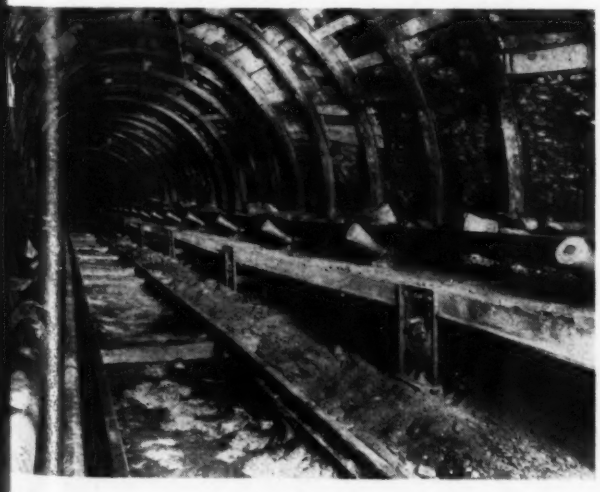
Another interesting driving head is shown as an artist's impression in Fig. 8, the Sutcliffe 'Two Hundred' two-drum design, for heavy belts using synthetic fibres in the duck construction (these being increasingly used to extend economic life of belting). The machine has two 42-in dia driving drums of heavy rolled steel construction, running in self-aligning ball bearings in renewable housings. The whole gearbox assembly can be opened-up for inspection and maintenance, without disturbing working parts, by removing the top half of the gearbox. Lubrication is by mechanical oil pump. A fluid coupling and automatic hydraulic loop take-up gear are used with this driving head. This machine is available in capacities of 200 h.p. to 325 h.p., and speeds of 350 ft/min to 600 ft/min can be accommodated. *Sutcliffe conveyors and allied equipment are made by Richard Sutcliffe, Ltd.*

In addition to underground conveyors and handling equipment generally, similar machinery employed on the surface for coal, coke and metalliferous mineral handling,

Fig. 4. Heavy-duty Meco gate conveyor with two drum driving head of in-line type, traction type fluid coupling, thrustor-operated brake with time lags and brake protection switches, centrifugal sequence control unit and combined winch loop and gravity take-up

Fig. 5. Meco channel stringer and cover plate structure for heavy-duty gate and trunk belt conveyors

Fig. 6. An underground roadway conveyor on an M. & C. stringer structure. (Photograph by permission of the National Coal Board.)

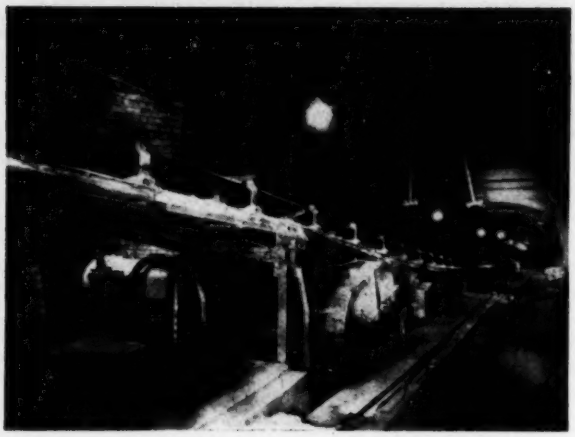


were also shown. Typical example of application of this type of equipment are shown in Figs. 9 and 10. Fig. 9 shows the coal and coke handling and grading plant at Willoughby Lane Gasworks, London, where more than 50 Huwood conveyors are installed. Fig. 10 shows two of the Huwood conveyors at this gasworks. *Huwood conveyors are made by Hugh Wood & Co., Ltd.*

Conveyorized Mining Machinery

Conveyorized production machinery is of special economic importance in narrow-seam coal mines, such as those which characterize British coalfields. During recent years great improvements have been made in British-made equipment of this type, and this now meets an important overseas demand as well as purely United Kingdom requirements. Typical examples are shown in Figs. 11 and 12. The former illustration shows a close-up view of a Mavor & Coulson Samson loader carrying a bridge conveyor. The latter shows a Mavor & Coulson bridge conveyor, designed to deliver to a gate conveyor. The bridge conveyor is hung from a runway at its near end and carried at its other end, by the Samson loader shown in close-up in Fig. 11.

The bridge conveyor illustrated forms a new means of removing the output of a Samson loader and delivering it continuously to a conveyor on the floor. The bridge loader



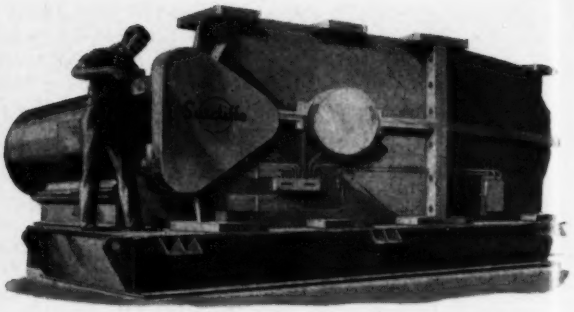


Fig. 7. (Left) Meco driving head of 100 h.p. working a trunk conveyor

Fig. 8. (Above) Artist's impression of Sutcliffe 'Two Hundred' driving hea

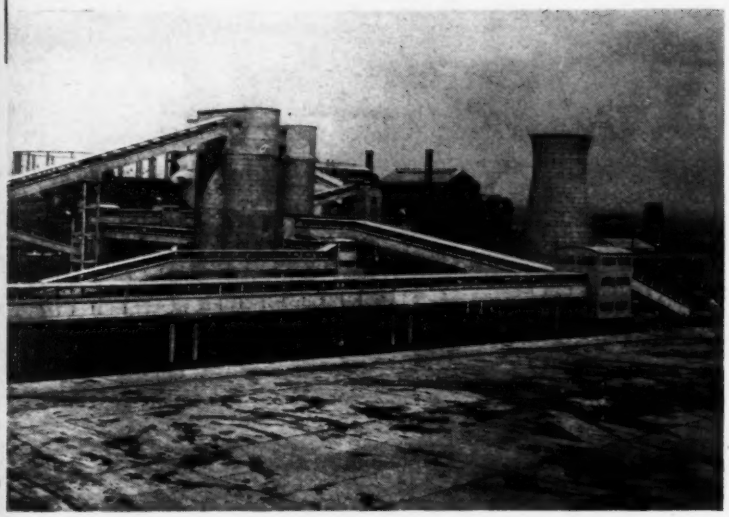
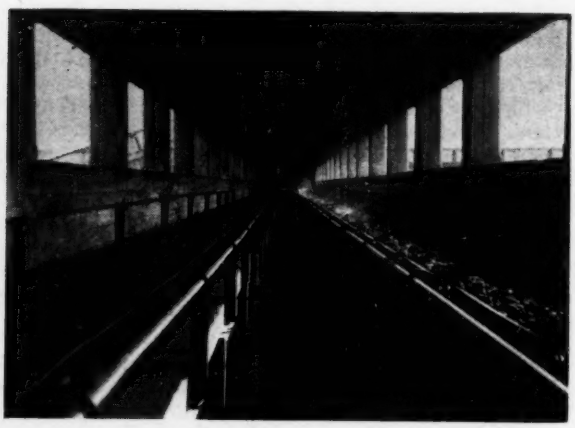


Fig. 9. More than 50 Huwood conveyors are used for handling and grading coal and coke in this plant, the Willoughby Gasworks, London

Fig. 10. Two of the Huwood conveyors in the plant shown in Fig. 9



has a short jib which can be raised or lowered hydraulically, but does not need to be slewed and is therefore made rigid sideways. Underneath is an arm carrying the ball of a ball and socket joint, by means of which it can pick up one end of the bridge conveyor and carry it clear of the ground. The conveyor structure is of lattice framework, supporting a troughed belt conveyor. The belt was shown running at 250 ft/min. It is driven by the head pulley through reduction gearing running in oil from a 5-h.p. hydraulic motor. The hydraulic supply pipes run to the rail end where there is a quick make-and-break self-sealing connection to a pump on the loader, driven by the loader motor.

When installed underground, the outby end of the bridge conveyor is either hung by a pivot from a wheeled block running along an overhead girder, or it is supported on a carriage astride the gate conveyor. At both ends plates guide the material, and the joint allows a relative movement of up to a right-angle to each side. *The bridge conveyor was shown running and the loader was shown moving about a yard to-and-fro on a curved path, showing how the bridge conveyor follows its movements, both endways and sideways, allowing the face of the tunnel or heading to be cleaned up without the loss of a moment.* In a separate transmission gearcase the gearing of the Samson loader will be seen turning slowly, illustrating the simple mechanical control of the crawlers and conveyor, and the strong construction.

The hydraulic haulage Samson on the Mavor & Coulson stand was a newcomer, not been previously exhibited in Britain. Test rig and gauges will demonstrate its great flexibility and infinitely variable automatic control. This coalcutter cannot be overloaded. Its height is only 17 in, width is 26 in, length is 8 ft 6 in, and power consumption is 90 h.p. A 19-in Samson of 75 h.p., was also shown, carrying a gumslinger, for disposing of the holings with high efficiency, leaving the cut clean, improving preparation of the coal, and reducing shotfiring. For power loading, there were two new Mavor & Coulson mining machines.

Latest types of coalcutting and power-loading machinery were, of course, demonstrated by all leading British manufacturers belonging to the Council of Underground Machinery Manufacturers. Two interesting examples are shown in Figs. 13 and 14. One of these, Fig. 13, is the latest model Anderton Shearer Loader, one of the simplest forms of power loading yet devised, and described by coalmining authorities as one of the spearhead of Britain's coal production drive. The machine on show was seen riding on a model C.20 armoured conveyor 30 in wide, to give the necessary handling capacity. The technical line-up is very interesting

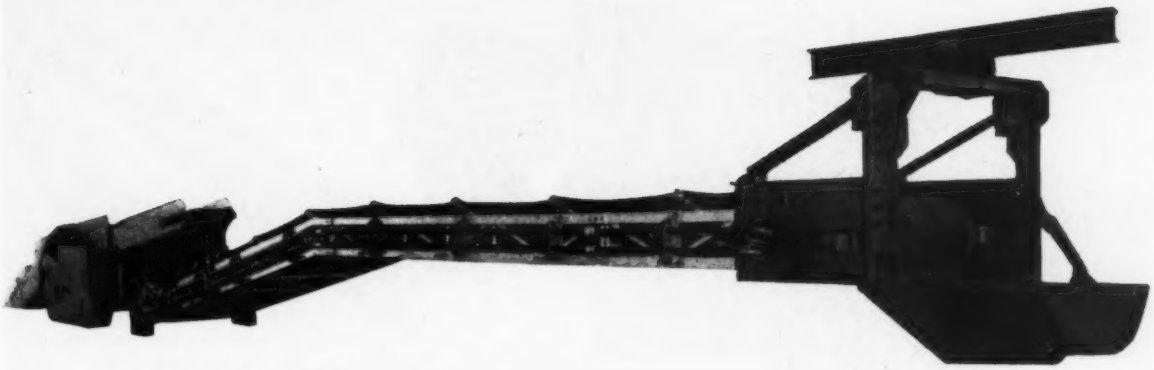


Fig. 11. M. & C. Samson loader carrying bridge conveyor

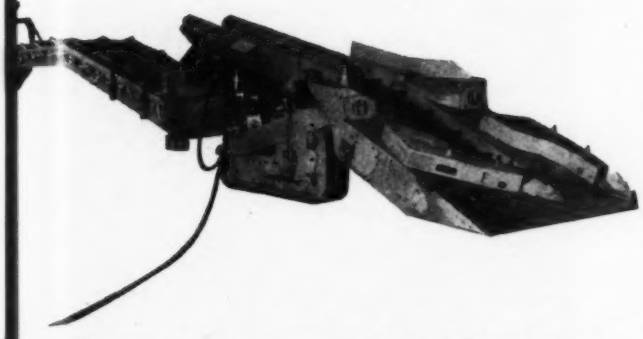


Fig. 12. M. & C. bridge conveyor, which delivers to a gate conveyor. It is hung from a runway at the near end and carried by a Samson loader at the other

Fig. 13. British Jeffrey-Diamond 125-h.p. Anderton Shearer loader

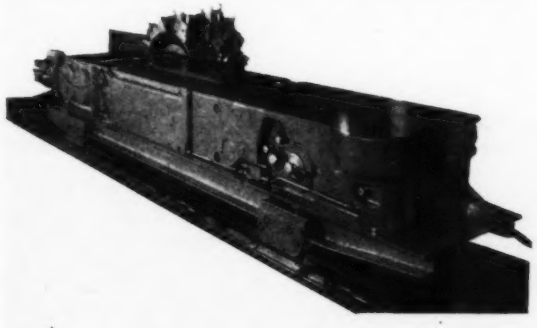
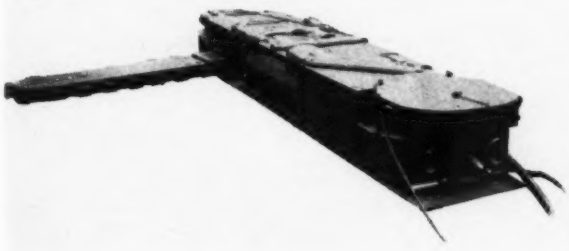


Fig. 14. British Jeffrey-Diamond 80-h.p. Ace coalcutter with Magnamatic transmission



and is given in what follows, the manufacturer being *British Jeffrey-Diamond, Ltd.*

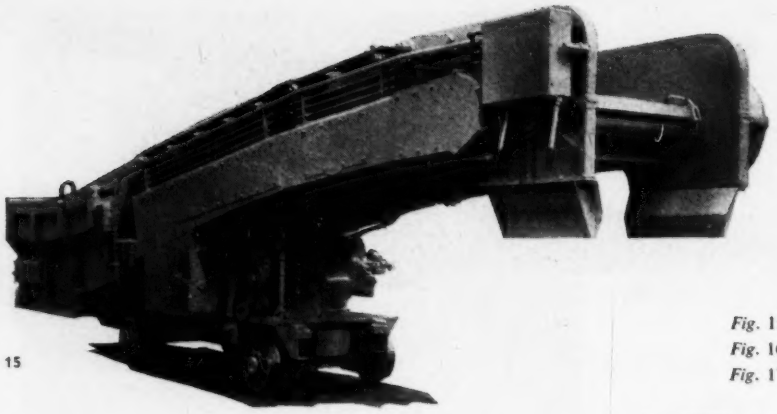
A 125-h.p. continuously rated, water-cooled electric motor drives a shearing unit of massive proportions and the haulage incorporates a newly-designed magnamatic transmission, with controls on the goaf side. The machine has a potential cutting rate of 30 ft/min, according to seam hardness. Alternative cutting units were shown alongside the main machine. Another development of the Shearer Loader, is the Trepan Shearer. This has a trepan head working forward of the Magnamatic unit, on the face side, in addition to the shearer drum in the normal position. Power comes from an 80-h.p. continuously rated water-cooled motor, and the Magnamatic transmission has side control.

The machine shown in Fig. 14 is the British Jeffrey-Diamond 80-h.p. Ace coalcutter, with Magnamatic transmission, one of four shown by this firm. This machine is arranged for armoured conveyor mounting and it is fitted with a duplex jib and Powerline cutter chains and loading plate. The motor is water-cooled and the transmission is side-controlled.

Increasing Mine Loader Capacity

A method of increasing mine loader capacity is shown in Fig. 15. This is the Allen-Sotin accumulator conveyor car, *made by W. G. Allen & Sons (Tipton), Ltd.* Generally, loader effectiveness is regulated by car-loading speed and, in practice, this is a bottleneck in drivage speed. The new machine is a speciality design for increasing effective working capacity of a loader in drivages such as stone headings of mines. It has a hopper with a certain spoil tonnage capacity, and a conveying element which transfers the spoil to a discharge point under which a mine car is 'spotted'.

The accumulator conveyor car is attached to the loader, and mine cars are 'inched' forward in turn, to ensure full loads being pushed away by rams when full. The car is designed for air operation and is fitted with a compressed air motor, driving the conveyor through reduction gears. The drive from the gearbox to the driving head is a standard roller chain and the conveyor consists of steel crossbars at fairly close pitch with special steel link chains, running in suitable steel sprockets. The conveyor chain is built up with silico-manganese steel links, suitably hardened and tempered, with nickel chrome pins and bushes and chrome molybdenum carriers for the crossbars, thus special attention is paid to the life and construction of this chain. The roller chain paths are lined with manganese steel liners. The



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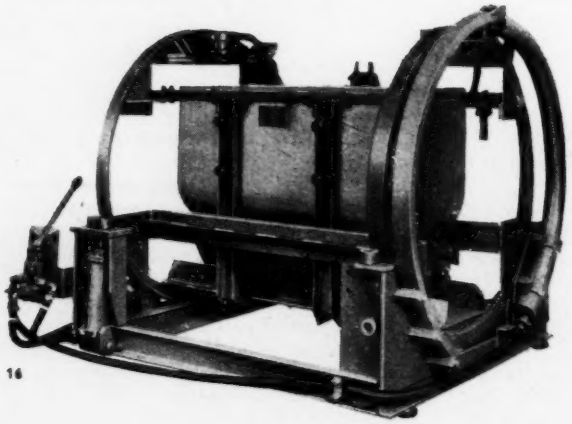

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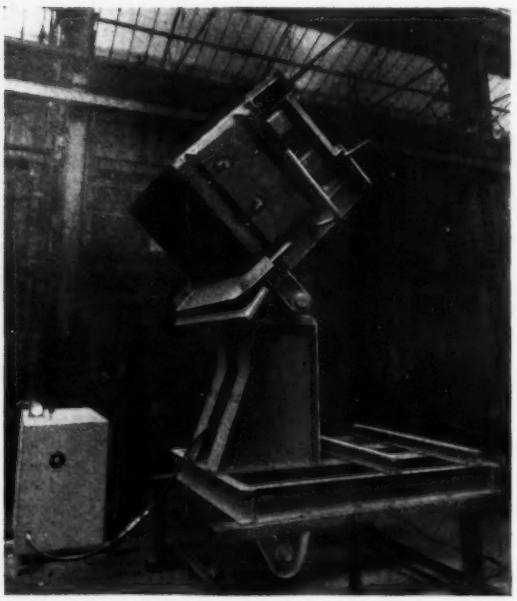
Fig. 15. Allen-Sotim accumulator conveyor car
Fig. 16. Nortons-Tividale pneumatic rotary tub tippler
Fig. 17. Allen hydro-mechanical tub tippler



17

hopper and boom are of steel plate and electrically welded throughout. The floor plate is of abrasion-resisting plate, with stiffeners to resist impact loads. The car is mounted on a steel channel frame chassis, with taper roller bearing type wheels and axles. The boom, etc., are hinged to the chassis with adjustable supports to regulate the height of the discharge outlet. Sockets are fitted to the boom to enable extension plates to be fitted if required.

The connection to the loader is usually made by heavy steel chain, with rubber shock-absorbing units mounted in suitable steel housings. All the air controls are at the discharge point, one main lever operating the main conveyor chain, 'spotting' of the car and ejection. An auxiliary lever operates the winch when hauling the empty mine car up to the loading point of the conveyor car. The car can be broken down into sections to fit inside a cage, and is easily assembled below ground.

Modern Tub Tipplers

Examples of modern tub tippling plants demonstrated at Olympia by British underground machinery manufacturers, are shown in Figs. 16 and 17, the former being a pneumatically operated B.K.S. machine made by *Nortons-Tividale, Ltd.*, the latter being an hydro-mechanical machine made by *W. G. Allen & Sons (Tipton), Ltd.*

The Norton-Tividale machine shown in Fig. 16 is for stationary tipping points. Tippling is through 140 deg or 170 deg by means of a compressed air cylinder. The cage automatically returns to the blocked position on release of air pressure, where it is fixed in position by an arresting device designed to allow safe tub cleaning. After release of this arresting device the cage rolls back into its original position. Operation is by self-acting closing valve, which stops the tippler drive automatically when the control lever is released. The machine is simple in design, with high tippling capacity, suitable alike for standard tubs and large capacity mine cars.

The Allen machine shown in Fig. 17 is for coal tubs which have to be tippled on to a conveyor running parallel to the track. Tub location is by manually operated stops and these can be 'locked open' to allow trains of tubs to run through. Hydraulic operation is employed, the whole of the tippling cycle being controlled, inching being possible, as well as stopping and reversing in any part of the cycle. The machine remains under the operator's full control should the electric supply fail. A restrictor check valve in the base of the ram prevent the tippler crashing back should a pipe fracture in the hydraulic circuit.

The tippler is constructed of mild steel plate and sections of electrically welded construction. The main bearings carrying the rotating bellcrank and platform are of the split plummer block type for ease of maintenance. Chute plates are fitted to prevent spillage into the working parts of

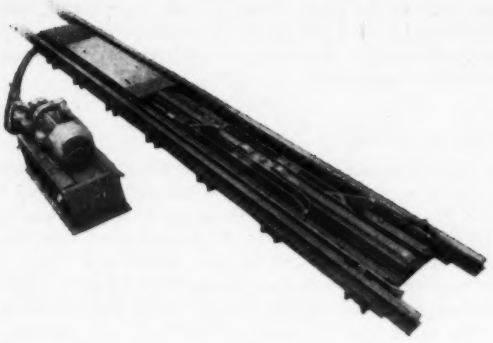


Fig. 18. Nortons-Tividale tub pusher

the tippler, and to guide the discharging material on to the conveyor. To give ample working clearance in the chute plates, the tippler has been designed to tip on to a 36-in conveyor running parallel to the tub track, and at 6 ft centres from centre line of track to centre line of conveyor. The tippler lifts the tub from rail level to the fully discharged position in approximately one minute, this rate being designed to allow the load to discharge slowly and evenly on to the conveyor. The design of the framework of the tippler allows it to be broken down into convenient pieces suitable for easy transport underground. The power unit consists of a flameproof motor (Buxton Certificate), coupled to a hydraulic pump and complete with reservoir filter, level indicator, pressure gauge, and relief valve. The control valve handle is fitted with a spring return to neutral and, in the neutral position, the oil supply is circulated back to the tank under no load.

Another very interesting exhibit on the Nortons-Tividale stand was a mine car cleaning device, which does not require to use high frequency vibration. During the dumping position, when on the above-described tippler, cars are lifted 4 in by small hydraulic cylinders, then dropped by their own weight, their top rims impacting upon flats fastened rigidly to the inner tilting cage. One cleaning operation requires 8 to 10 lifts and drops of a mine car. The air supply to the lifting cylinders is automatically controlled throughout.

Fig. 21. Fluidrive size 12·75 fluid coupling unit

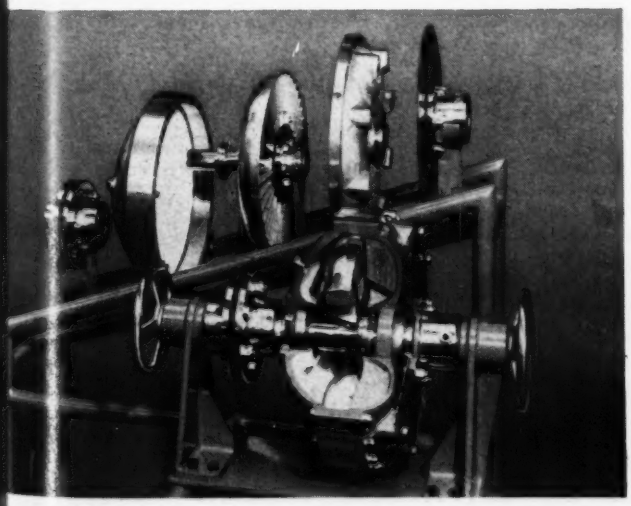


Fig. 19. Wild self-advancing Desford chock

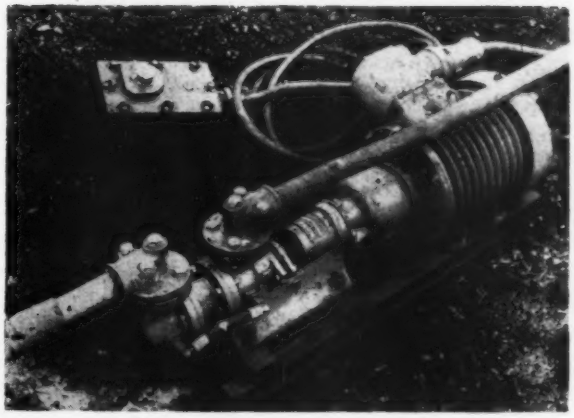
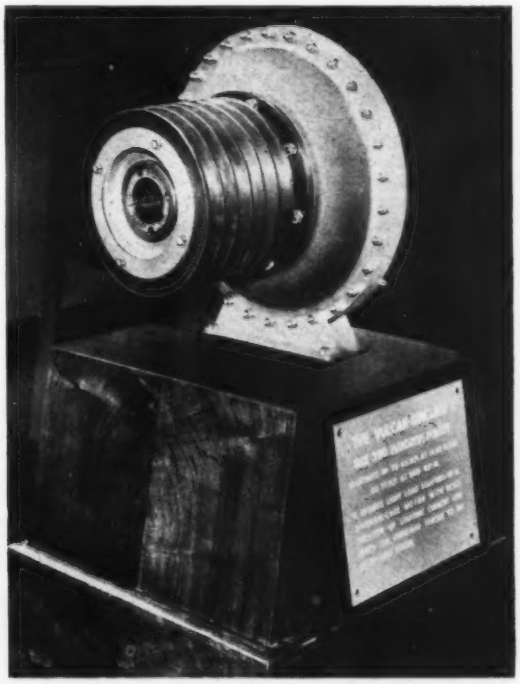


Fig. 20. Small Mono pump face unit for nuisance water at colliery face

Fig. 22. (Below) Size 390 Fluidrive pulley



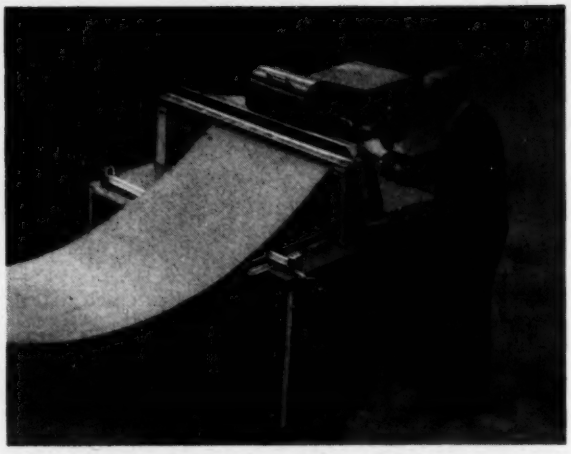


Fig. 23. Mastabar Comet hydraulic conveyor belt power lacing machine

An electro-hydraulic tub was also shown on the same stand. This is illustrated in Fig. 18. It is powered by geared pump, placed on the oil reservoir, outside the rails, the pump being electrically driven through an elastic clutch. The tub pusher, located on sleepers between the tub rails, has two feed cylinders, with piston rods inter connected by toothed supports coupled through gear wheels, oil flow being automatically changed over from one cylinder to the other, the tub pusher being overload-protected by safety valve. At loading stations tub pushers are controlled from locally convenient locations, through control valves, motor and pump being kept running. Design features include low overall height, easy fixing on sleepers, no excavation being necessary, ability to place drive at any convenient spot without having to block the roadway, ample power capacity, overload protection, standard conveying speed of 11¾ in/sec, adjustable from zero upwards.

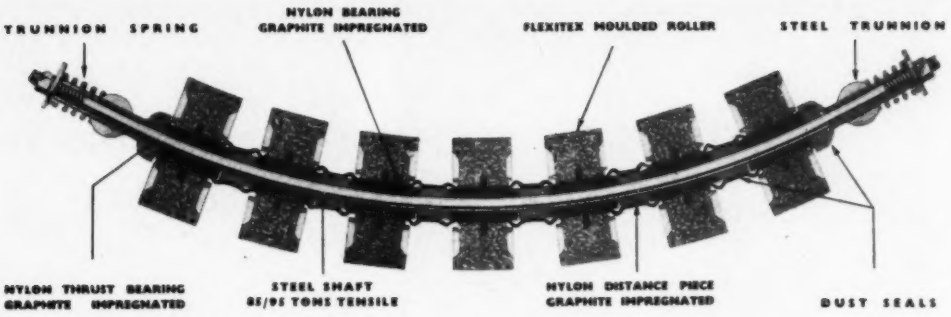
Other Exhibits in Brief

Further details of interesting exhibits at Olympia are given in brief in the remainder of this show report. *A. G. Wild & Co., Ltd.*, for example, were showing a self-advancing Desford chock, Fig. 19. This is of the goal-post type and operates with two 50-ton chocks as a single unit under a common roof bar. It is water-operated, from a high pressure fire main, or by closed circuit from an in-by high pressure pump. The same firm displayed a 'Witt' spraying machine, designed to fireproof timber in intake roadways of coal-mines, as well as a Wild hydraulic chain tensioner, a Wild hydraulic flight bar straightener, and Brettel hydraulic pullers. The chain tensioner is designed to eliminate injury hazards in chain tensioning. The flight bar straightener deals with bent bars *in situ*. The hydraulic pullers can generate pulls of 10,000 lb and 5,000 lb single-handed, according to model.

Fig. 20 shows a small Mono pump face unit for dealing with nuisance water at the colliery face, exhibited by *Mono Pumps, Ltd.* It is powered by a motor suitable for taking a supply from a drill power panel. Figs. 21 and 22 show two exhibits shown by *Fluidrive Engineering Co., Ltd.*, a size 12·75 fluid coupling unit, Fig. 21, and a size 390 fluidrive pulley, Fig. 22. An interesting device, exhibited by *Mastabar Mining Equipment Co., Ltd.*, is shown in Fig. 23. This is the new Comet hydraulic power lacing machine, which mechanically joints all conveyor belts up to 42 in wide and ¼ in to ⅝ in thick. Designed for colliery belt repair shops, the machine has a built-in belt cutter and

Table 2. List of exhibits supplementary to those already described.

Manufacturers (alphabetical order)	Exhibits in Question
Austin Hoy & Co., Ltd.	*Coal cutter chains, particularly the new Thin Kerf unit.*
A. T. & E. (Wigan), Ltd., and Communications Systems, Ltd.	*Automatic telephones for coal face use.*
British Jeffrey-Diamond, Ltd.	*Electric motor insulation for wet underground conditions, conveyors, cutter chains, compressed air turbine, coal crushers.*
J. H. Fenner & Co., Ltd.	*P.v.c. (plastic) conveyor belting, flexible couplings, V-belt drives, chain drives, ball bearing plummer blocks.*
Hugh Wood & Co., Ltd.	*Huwood Slicer: an 'activated plough' for longwall faces in seams more than 4 ft thick too hard for ordinary ploughing, incorporating a Python conveyor; conveyors; signalling system; props.*
Hickson's Timber Impregnation Co. (G.B.), Ltd.	*Mine timber vacuum/pressure impregnated with flame retardant preservative.*
Laurance, Scott & Electromotors, Ltd.	*Flameproof electric motors and control gear.*
Mastabar Mining Equipment Co., Ltd.	*Hydraulic roof supports.*
Nortons-Tividale, Ltd.	*Hydraulic props.*
Revol, Ltd.	*Lubricants for enclosed gears, wire ropes, cables and chain drives.*
Richard Sutcliffe, Ltd.	*Driving heads for gate belt conveyors, bunker conveyor, inverted belt system.*



ig. 24. Fisher & Ludlow lexiroll troughing idler

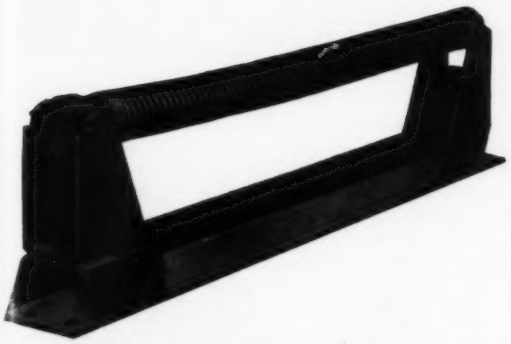


Fig. 25. Huwood Featherbed impact idler, designed to substantially reduce belt wear and conveyor loading and transfer points

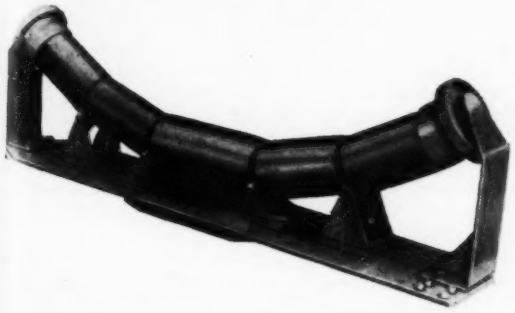


Fig. 26. M. & C. steering idler for keeping a 42-in belt central

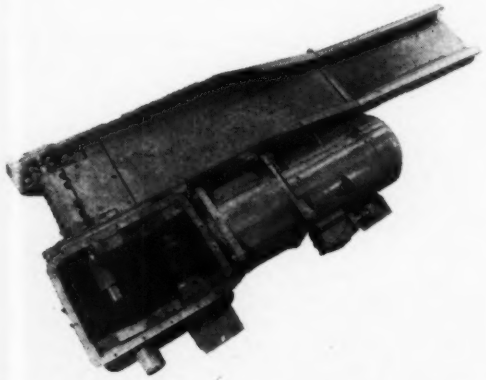


Fig. 27. M. & C. drive for flexible armoured conveyors, 50-h.p. model, height is only 24½ in

squarer and inserts 15 in of lacing in one cycle. Operation is automatic, and an indicator gauge is provided for selection of fasteners and machine settings.

Another very interesting exhibit was shown by *Fisher & Ludlow, Ltd.*, a Flexiroll hammock-type troughing idler set, Fig. 24, which uses a new kind of fireproof conveyor idler, designed to control p.v.c. (plastic) conveyor belting under all loading conditions. The following claims are made for this new development: no lubrication is needed, due to use of nylon graphite-impregnated bearings; there is no fire risk because there is no metal-to-metal contact; flexing of the idler eliminates dust build-up; the shallow trough of the idler allows the belt to make contact with the face of all rollers thereby maintaining belt control through all stages of loading; use of spring-loaded trunnion eliminates roller impact under load and so reduces material breakage. Flexiroll troughing idlers are also claimed to prolong belt life for the following reasons: the belt is fully supported under all load conditions; each roller acts as a shock absorber and protects the belt against impact; the natural belt catenary shape is provided by use of a pre set steel shaft; the roller formation employed is designed to clean damp and sticky materials from the conveyor belt. Furthermore, the weight of the new troughing idlers is only one-third that of conventional types, which is highly advantageous when installing conveyors in confined spaces or where access is difficult. In addition, this enables important savings to be made in the weight of the supporting structure for overhead and inclined conveyors. The same manufacturer also exhibited Flexiroll conveyor structures.

A newly developed impact idler, exhibited by Hugh Wood & Co., Ltd., is shown in Fig. 25. This is the Featherbed impact idler, designed to substantially reduce belt wear at conveyor loading and transfer points. This consists of a coil spring suspended on end bearings and 'gives' to the load in a way claimed to be not possible in other impact idlers. It was shown as part of a Huwood Featherbed tail end receiving hopper. Fig. 26 shows another idler shown by M. & C., a steering idler designed to keep a 42-in reversible belt central. It is made by Mavor & Coulson, Ltd. Fig. 27 shows a further M. & C. exhibit, a new drive for flexible armoured conveyors. The height of a 50-h.p. drive, as shown, is only 24½ in.

Important Exhibits Worth Close Inspection

This show review, although necessarily brief, is in fact already tending to over-run space reserved for the subject in this month's *Mechanical Handling*. Nevertheless, nothing like justice has been done to interesting exhibits which have already been brought to the Editor's notice. And, for those who are able to do so, the list of exhibits (on the opposite page) which should be carefully studied, should be added to those already briefly described in the report. Many of these may be described in a future issue.

INSTITUTE OF MATERIALS HANDLING FIRST INTERNATIONAL CONFERENCE

THE First International Conference of the Institute of Materials Handling was held at the Waldorf Hotel, London, from May 6th to 8th.

This was probably the most ambitious project the Institute has launched since its formation in 1952 and it is gratifying to record that it appeared to be in all respects an overwhelming success.

Three hundred delegates attended the Conference, many accompanied by their wives, and they included visitors from nine overseas countries. Some indication of the expanding influence of this still comparatively young Institute was given by the presence of a contingent from the Australian Division which was formally constituted in 1957.

The layout of the business sessions of the Conference took a rather original form and no doubt contributed largely to its technical success. It is always difficult for an Institute whose members represent so many different industries to select a theme which will appeal to a large cross-section of its membership. Having taken as the general theme for the Conference, Materials Handling in the New Europe, the decision was taken to hold only two Plenary Working Sessions at the beginning and end of the Conference and to conduct four separate channels of papers simultaneously in between. Each channel provided papers from different countries on a particular theme which it was thought would appeal to one section of industrial interests. Delegates could, however, if they wished, attend the presentation of papers in more than one channel. It was thus possible to follow two aspects of materials handling in France and a third in Sweden if a delegate wished.

The National Chairman of the Institute, Mr. Charles Manners, introducing Sir Edward Beddington-Behrens, who formally opened the Conference. On the left is Mr. C. Remfry, chairman of the Conference Committee

The Conference was opened formally by Sir Edward Beddington-Behrens, C.M.G., M.C., Ph.D., at 3 o'clock on May 6th, under the chairmanship of the then National Chairman of the Institute, Mr. Charles Manners. Sir Edward Beddington-Behrens was without doubt an excellent choice for the role in view of the work he has done in this country in the cause of political and economic unity and in particular with the conception of the European Free Trade Area. The formal opening was followed by the opening Plenary Session at which Mr. J. H. M. Pinder, the Managing Editor of the Economist Intelligence Unit, gave a most comprehensive paper on the Economic Background of Materials Handling in Europe. Mr. Pinder had as chairman Professor Gilbert Walker, M.A., of Birmingham University, who is well known for his contributions to the economics of transport. Professor Walker covers a powerful brain with an engaging manner of apparent flippancy which nevertheless contains some pointed barbs of wisdom. After tea, the day closed with the showing of a selection of films on materials handling, in two cinemas.

The whole of Thursday, May 7th, was devoted to working sessions in the four separate channels, namely: The Role of Containers and Pallets in International Transport; Materials Handling and Ships; Handling in the Manufacturing Industries; Handling in Warehouses.

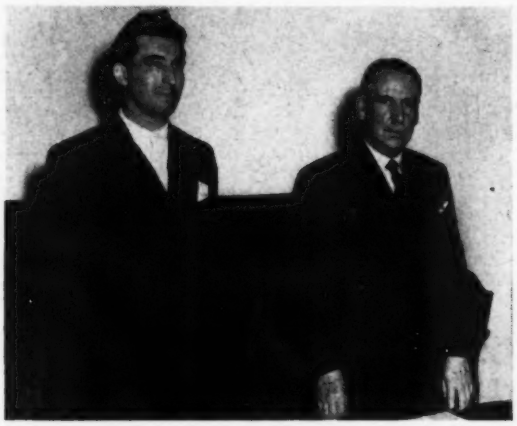
The three papers in each channel were followed by a Seminar at which a United Kingdom *rapporteur* summarized what had taken place in the three previous sessions and the three speakers formed a panel to answer questions.

In the first channel, The Role of Containers and Pallets in International Transport, the speakers were Mr. A. A. Harrison, of British Railways, with Mr. A. C. Cooper, chairman of B.I.T.A. in the chair; Mr. J. Dorjee, managing director of Van Gend & Loos, Holland, one of the largest road transport operators on the Continent, with Mr. D. H. Bridge in the chair, and Mr. R. Muther of the U.S.A., with Mr. D. A. Bowman in the chair. At the concluding Seminar the *rapporteur* was Mr. D. B. Pascall with Mr. A. Fraser Much in the chair.

In the channel for Materials Handling and Ships, the speakers were Mr. A. Vincenti of France, with Mr. Gavin Paterson in the chair, Mr. P. Chalmers Somerville, who is a prominent figure in Scottish shipowning circles, with Mr. J. D. Fortune in the chair, and Mr. K. Plutynski, of the Polish Ministry of Marine, who was assisted by Mr. I. Obertynski, head of the Stevedoring Department of the port of Gdynia. The chairman at Mr. Plutynski's session was Colonel Oram, late of the Port of London Authority, and this session was followed by a Seminar at which the

Mr. A. Vincenti of France (left), speaking on Port Handling, and Mr. Gavin Paterson who was in the chair

Mr. J. H. M. Pinder, of the Economist Information Unit, who gave a paper on The Economic Background of Materials Handling in Europe to the First Plenary Session under the chairmanship of Professor Gilbert Walker of Birmingham University (centre)



Mr. K. Plutynski of the Polish Ministry of Marine (left) and his chairman, Lieutenant Colonel R. B. Oram

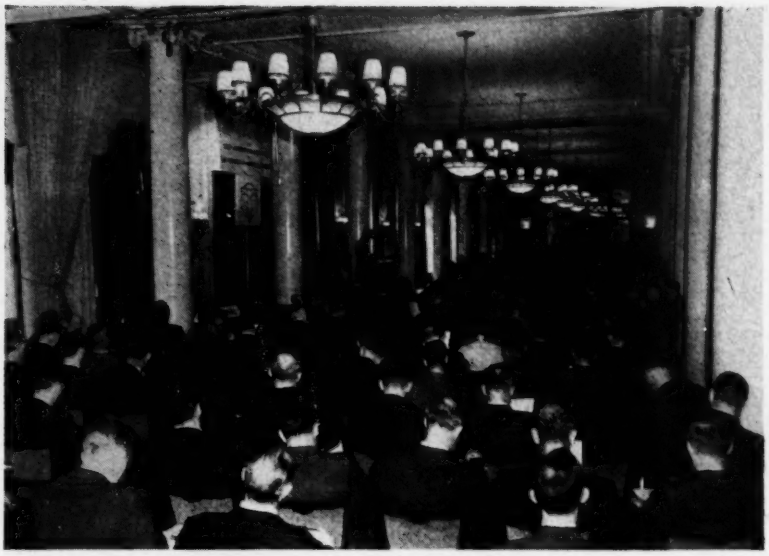
rapporteur was Mr. J. Morgan, under the chairmanship of Mr. A. W. Fawke.

The third alternative channel was devoted to Handling in the Manufacturing Industries. The first paper was given by Mr. H. Krippendorff, of Germany, with Mr. K. B. Picknett in the chair. Mr. Krippendorff was for nearly 20 years active in the German aircraft industry and is at present a regional director of the German national organization for the improvement of materials handling. He was followed by Mr. P. Bezier of the Renault Company of France, who had as his chairman Mr. M. C. Boss of France, and the third paper in the channel was presented by Mr. J. D. Parkes, technical director of Lever Brothers (Port Sunlight), Ltd., with Mr. J. Findlay in the chair. The *rapporteur* at the final Seminar was Mr. J. Sharp, with Mr. A. W. Payne as chairman.

The fourth channel was devoted to Handling in Warehouses.

Mr. H. Malmstrom (left) and Mr. E. Bohlin of Sweden

Mr. J. Dorjee (left), managing director of Van Gend & Loos of Holland, who spoke on The Role of Pallets and Containers in International Transport. With him is his chairman, Mr. D. H. Bridge



LEFT
The Final Plenary Session, at which Mr. R. W. Johnson of the U.S.A. gave a paper on World Integration of Freight Handling, with Mr. Ernest Whitaker, transport adviser to Unilever Ltd., in the chair

BELOW LEFT
Mr. Charles Manners, the National Chairman at the time of the Conference, and Mrs. Manners (left) receiving Mr. and Mrs. H. S. Pocock of Iliffe Press

BELOW
A view of the top table at the banquet. From left to right, Mr. David Blee, vice-chairman of the Institute of Transport, Professor Gilbert Walker and the chairman. Mr. Blee proposed the health of the Institute and Professor Walker replied to the toast of 'The Guests', proposed by Mr. George Downie

Mr. L. J. Hoefkens of the Lockheed Hydraulic Brake Co. gave the first paper, with Mr. R. J. T. Hewitt as chairman, being followed by Mr. E. Schneider of Siemens-Elektrogerate A.G. of Germany, with Mr. C. W. Sharp in the chair and Mr. H. Malmstrom of Sweden. Mr. Malmstrom is managing director of the port of Stockholm and he had as his chairman his compatriot, Mr. E. Bohlin. Mr. R. G. Wilson acted as *rapporteur* at the final Seminar with Mr. A. G. Taylor in the chair.

The second day of the Conference concluded as before with a selection of films shown simultaneously in four cinemas.

By way of contrast the whole of the morning of May 8th was given over to works visits, of which the delegates had a choice of no less than 12, as follows:

The Metal Box Co., Ltd.; Port of London Authority; Yardley & Co., Ltd.; British Road Services, Ltd.; James Pascall, Ltd.; Express Dairies, Ltd. (South Morden); Ford Motor Co., Ltd.; I.C.I. Ltd., Paints Division; Price Candles, Ltd.; Tarmac Civil Engineering, Ltd. (Yorkshire Motorway); Firestone Tyre & Rubber Co., Ltd.; S.P.D., Ltd.

Some 250 delegates and their ladies took part in these visits, which provided an opportunity for members of the Institute and visitors from both home and abroad to see something of the way other people tackle the various problems encountered in materials handling.

(*continued on page* 425)

A general view of the reception at the banquet with which the Conference closed

In the afternoon, the Final Plenary Session of the Conference took place with a paper on The World Integration of Freight Handling, presented by Mr. R. W. Johnson of the U.S.A. Mr. Johnson is a member of the American Society of Packaging and Handling Engineers and the Institute of Packaging, Handling and Logistic Engineers, and has had considerable experience in large-scale construction, including that of roads and airfields. His chairman was Mr. E. G. Whitaker, transport adviser to Unilever, Ltd. It is a great tribute to the way in which interest was sustained throughout the Conference that at this concluding Plenary Session virtually every seat in the large Conference Hall was filled.

It is indeed very rarely that so much consistent interest and enthusiasm has been evidenced at a Conference of this sort. Every paper, whether plenary or channel, was followed by intense questions and discussions and in each case questions had to be curtailed by the clock. To take one channel session, that of Mr. Vincenti of France, as a random example, the international nature of the Conference was brought home by the fact that to assist Mr. Vincenti over half those who put questions to him did so in French, providing their own translations for the benefit of the others present who did not speak the language. There was a tremendous air of realism about the Conference also. If the general tenor of the papers and discussions at this Conference was any guide, the Institute itself seems to have got past the stage of beating the big drum of materials handling as a universal panacea regardless of circumstances. Speakers and delegates generally stressed the difficulties and limitations of the various types of handling they were discussing as well as their advantages. This realistic approach can do nothing but good in advancing the cause of materials handling in conjunction with its sister technology of work study.

The choice of speakers in the various channels and the allocation to them of the different aspects of the subject concerned seemed also particularly well done. To take again as a random example the channel devoted to Materials Handling and Ships, in the first session Mr. Vincenti of France gave a general resumé of the subject and some examples of achievements to date. Mr. Chalmers Somerville followed with a detailed examination of current problems in Port Handling and Ship Design with suggestions for their solution. In the third session, truly complementary to the previous two, the Polish speaker dealt in considerable detail with the practical working of ports under his jurisdiction. To bring together and co-ordinate three speakers from three different countries into such a successful melange was no mean achievement on the part of the Conference organizers under the chairmanship of Mr. Charles Remfry, the now national chairman.

At the closing of the Conference at 4.30 p.m. by Mr. Charles Manners, the National Chairman of the Institute, the accent was changed to the social side with a banquet for delegates, members of the Institute and their ladies, which took the place of the normal annual dinner. This glittering occasion was again something more ambitious than the Institute had ever tackled before and was again crowned with success. Some 310 members and guests sat down to dinner, which was followed by dancing until 1 a.m. Before the banquet, Mr. and Mrs. Manners received their guests, who included representatives of a wide range of users and manufacturers of handling equipment and of kindred Institutes as well as nearly all the overseas visitors.

In his speech proposing the health of the Institute, Mr. David Blee, general manager of London Midland Region of British Railways, as national vice-chairman of the Institute of Transport emphasized the common ground on which the two Institutes could work together, a theme which was also echoed in his reply on behalf of the Institute by Mr. Manners. In proposing the health of the guests, Mr. George Downie, who is chairman of the National Joint Committee on Materials Handling, as well as a founder member of the Institute, was able to enumerate the long list of countries from which members and visitors had come to make the conference so successful. In his reply for the guests, Professor Gilbert Walker was in his wittiest form.

All being well, the Institute of Materials Handling hope to make their International Conference a regular bi-annual affair to fall in the years in which there is no Mechanical Handling Exhibition. If they are able to maintain the same high standard which marked their first Conference, this bi-annual event should make a most valuable contribution to the world of materials handling.

Sets of Conference papers can be obtained on request from the Secretary of the Institute, Mr. H. M. C. Harwood, O.B.E., 69 Cannon Street, London, E.C.4, price 2 guineas post free.

NEW PRESIDENT FOR BRITISH INDUSTRIAL TRUCK ASSOCIATION

JOHN R. SHARP, Joint Governing Director of Lansing Bagnall, Ltd., has been elected President of the British Industrial Truck Association (B.I.T.A.) formerly known as the Industrial Truck Manufacturers Association (I.T.M.A.). Mr. Sharp is one of the oldest in membership of the National Council of this Association and he was the member who represented the Fork Truck Industry on the Anglo-American Council on Productivity Specialist Team which went to the U.S.A. in 1949. This team, incidentally, produced one of the best selling of all productivity reports 'Materials Handling in Industry'.

Mr. Sharp, with one or two others, was largely instrumental in encouraging and fostering the Institute of Materials Handling in England, which has been successful in the six years of its existence and has now over 1,500 members. B.I.T.A. is the national association of manufacturers producing industrial trucks (platform and elevating industrial trucks, tractors and numerous forms of hand trucks). B.I.T.A. are active members of the Fédération Européenne de la Manutention, which is an association of materials handling equipment manufacturers throughout Europe.

TWO NEW FACTORIES OPENED

Two firms recently opened new factories in the Provinces—Renolds Chains, Ltd., at Burton-on-Trent and Metalastik, Ltd., at Leicester

Renold Works, Burton-on-Trent

Mr. John Rodgers unveiling the plaque with (left to right seated) Mr. Oscar Bertoya, managing director; Sir Charles Renold, J.P., chairman; Alderman F. G. Peach, J.P., the Mayor of Burton-on-Trent; Mr. W. S. C. Tully, C.B.E., deputy managing director

Official Opening of Renold Works, Burton-on-Trent

RENOLD CHAINS, LIMITED, are well known as precision chain engineers manufacturing transmission and conveying chains, wheels and accessories for all mechanical purposes; chain drives, couplings and clutches; chain mortise gear, chains for cycle, motorcycle, automobile, marine and aircraft applications.

The Company has four manufacturing establishments, at Manchester, Coventry, Cardiff and Burton-on-Trent, and the Head Office is at Renold House, Wythenshawe, Manchester.

The chain requirements of industry are served in this country by nine Stock Depots and Branch Offices in the principal cities. Overseas the Company is represented in all major markets and has Subsidiary Selling Companies in France, Belgium, Holland, Germany, Canada and Australia.

Renold Works, Burton-on-Trent, which was opened recently, represents the latest extension to the Company's manufacturing capacity. The site and original factory at Horninglow Road, which occupies an area of 5½ acres, were acquired in December, 1955, and extensions to the original factory were commenced in April, 1957.

The cost of the complete project, including equipment, will be approximately £1,000,000. The factory, which has the most modern equipment installed, is almost exclusively manufacturing chains for mechanical handling.

The weekly output can be measured in miles, and each year enough chain is made to stretch from Land's End to John o' Groats. The total weight of chain produced in a year is nearly 3,000 tons.

The chains are used on every type of mechanical handling plant and range from 3,000 lb to 300,000 lb breaking load. It is expected that some 600 people will be employed. Over 30 per cent of the chain made at Burton-on-Trent is exported directly to almost every country in the world.

The architect for the extensions to the factory was Frank M. Green, F.F.A.S., L.R.I.B.A., M.I.Struct.E., of

William J. Green and Associates, whilst the building contractors were Thomas Lowe & Sons, Ltd., Curzon Street, Burton-on-Trent.

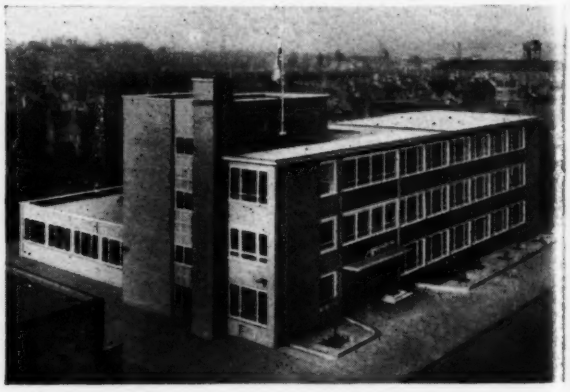
This new works was officially opened by John Rodgers, M.P., Parliamentary Secretary to the Board of Trade.

Metalastik, Ltd., Open New Offices Research Department

METALASTIK, LTD., celebrated its 21st anniversary a year ago while the new office and research block was nearing completion. Until this building was ready for occupation, the company was housed at the other side of Evington

Raw materials store looking towards press bay with overhead conveying system in background (Left)

Metalastik office and research building, Leicester (Below)

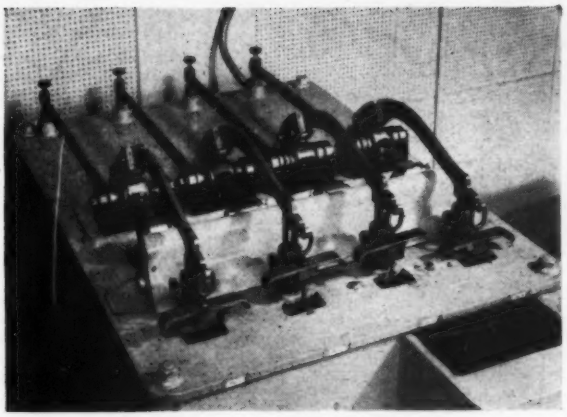


Valley Road under the roof of the John Bull Rubber Co., whose offices and factory dominate this part of Leicester.

The long association of Metalastik with John Bull began in 1936 when Mac Goldsmith, an engineer who had established a name for himself in the German motor industry, convinced the directors of John Bull that there was a great future in rubber-bonded-to-metal components. Although still in his thirties, Mr. Goldsmith had already built up two successful engineering companies in Germany – one of which developed the newly discovered process of rubber-to-metal bonding.

Metalastik, Ltd., was formed by John Bull in conjunction with Mr. Goldsmith and registered as a limited company on May 1st, 1937. Mr. Hubert Burton, who with other associates built up the John Bull Rubber Co., was appointed chairman, a position he retained until his death in 1955. Other directors were Mr. A. G. Barrett and Mr. M. H. Halibut.

Although the discovery that soft rubber could be bonded to metal had been made some years earlier, rubber bonding as a commercial process was still in its infancy in 1937 and little was known about the properties of bonded rubber components. The value of rubber for vibration damping was appreciated but so too were the difficulties of incorporating rubber in dynamic structures. Commenting on this situation in 1938, a leading engineering journal said, 'there is no doubt that the use of rubber in damping torsional oscillation and the vibration present in practically every kind of continuously moving machine would have been by now much more extensive if it had not been so difficult to secure the elastic rubber to the rigid metal'.



Fatigue testing machine for Metalastik bushes fitted in the pivots of a vehicle suspension or in shaker screens and vibratory conveyors are subjected simultaneously to radial and torsional loads. On this machine, which reproduces working conditions, four bushes can be tested at the same time under different load conditions

BOOK REVIEW

AUTOMATION TO-DAY AND TO-MORROW. *By L. Landon Goodman.* Published by Iota Services, Ltd. Price 40s. net. Specially reviewed for *Mechanical Handling* by L. W. Bailey, F.R.Econ.S., A.M.I.Prod.E. (L. W. Bailey & Partners, Ltd., Industrial Consultants.)

A FEW YEARS AGO automation and automatic factory were headline news in the daily and popular press and, if some articles were to be taken literally, the time was not then far off when most of our material needs would be produced in fully automated push-button-operated factories controlled by electronic brains.

Nobody closely connected with industry gave very serious regard to such exaggerated accounts of automation and, to-day, in the mind of the general public, sputniks and lunar probes have displaced the automatic factory.

But developments in the field of automation, instrumentation, process control and electronics continue to be made, though the spotlight of publicity is no longer focused on them. For this reason Mr. Landon Goodman's new book 'Automation To-day and To-morrow' is timely since it gives a balanced review of developments to date and indicates the possibilities for the immediate future.

To some extent the sub-title of the book, 'A Technical survey of current progress' is misleading, since though the book certainly does survey progress in the techniques of automation, it does so in language readily understandable by anyone with some knowledge of industry.

In his introduction Mr. Landon Goodman refers to the many varying definitions of automation and gives his own as: 'the technology of automatic working in which the handling methods, the processes, and the design of the processed material are integrated to utilize as fully as is economically justifiable the mechanization of thought and effort in order to achieve an automatic and, in some cases, a self-regulating chain of processes'.

The writer of this review is not entirely in agreement with all of this definition but its omnibus character allows the discussion of highly mechanized and near-automated processes as well as fully automated processes and the book is of greater value on that account.

The book is in two parts. The first part written by Mr. Landon Goodman examines the development in automation whilst the second part is an extensive bibliograph of books, papers and articles published throughout the world on automation and the automatic factory. This bibliography was compiled by Iota Services, Ltd., the publishers of the book.

The dual purpose of the book needs to be borne in mind in reading the text which sets out to cover a very wide field ranging from planning for automatic production to the sale and distribution of the product touching *en route* such problems as management, manpower, research, building design, etc. In addition, numerous examples are given of automated or near-automated processes in a wide variety of specific industries.

The numerous chapters of the text, therefore, are necessarily brief but even so little of importance escapes mention and some of the examples discussed have not previously been published.

The bibliography, the second part of the book, contains over 800 references and is itself in two sections, the first dealing with automation as such and its applications in numerous industries and to particular processes in those industries. The second section gives references in the field of management, both theory and practice, and also to writings on the economical and social implications of automation.

The bibliography is well indexed under both subject and author and the reader should have no difficulty in finding references to literature on any aspect of the subject he wishes to pursue.

REVIEW OF NEW EQUIPMENT

The latest Londex mains failure alarm bell which requires no battery or auxiliary supply

MAINS FAILURE ALARM BELL

Failure of a mains supply to electrical appliances and machines, such as sub-stations, continuous processes in chemical and food industries, incubators, lifts and hoists, burglar alarms, etc., that have necessarily to operate continuously without constant attention may be costly if not attended to immediately. A battery-operated alarm bell that rings when such a failure occurs is a reliable safeguard only if the battery is regularly tested and replaced as required. A simple mains failure alarm that does not require a battery or auxiliary supply is the Londex, developed by Londex, Ltd., Anerley Works, London, S.E.20.

The equipment consists of a clockwork bell which will ring as soon as the mains supply to the coil of the relay chassis is broken. The bell will ring for two minutes and is rewound simply by turning the bell dome in clockwise direction. The bell can be fitted with a visual device to indicate that it needs rewinding. An auxiliary relay type SMF can be supplied to give an alarm or indication where a battery supply is available. To provide a visual indication of a healthy supply, a miniature mains neon lamp can also be supplied with the unit as an optional extra.

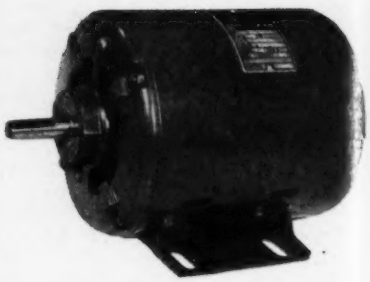
SMALL ELECTRIC FORK LIFT TRUCK

On account of its unusually compact dimensions, the new Piccolift electric fork lift truck should be found to be particularly useful for handling operations where floor space is limited. It possesses all the advantages of the sit-on rider-controlled truck, but its length is only 37 in. Its capacity is 1,120 lb at 24 in and 1,300 lb at 20 in load centres. It is of the three-wheeled type, and each of its two front wheels is driven by an independent motor, with current supplied by electric traction batteries, giving maximum traction for gradient work. Towing capacity is available up to 10 tons, and a height of lift from 60 in to 138 in can be provided. Cushion tyres are fitted as standard.

The Piccolift truck has been recently introduced by G. Hunter (London), Ltd., 80 Fenchurch Street, London, E.C.3.

FRACTIONAL HORSEPOWER MOTORS

A new T.45 range of fractional horsepower motors announced by Crompton Parkinson, Ltd., Crompton House, Aldwych, London, W.C.2, comply with B.S.170 and have mounting dimensions of American standard NEMA 48. They have a centre of only 3 in, and seven popular methods of mounting include solid-foot, resilient, end-face and oil burner flange. Improved features include a roomier terminal box in the endshield, big terminal nuts, space-saving conduit entry hole in the stator frame, slots under the lid, providing an alternative entry for T.R.S. cables, and a stiffer end bracket with improved manufacturing tolerances in concentricity and bearing alignment.



One of the new T.45 range of fractional horsepower electric motors rated at ½ h.p. at 1,425 rev/min

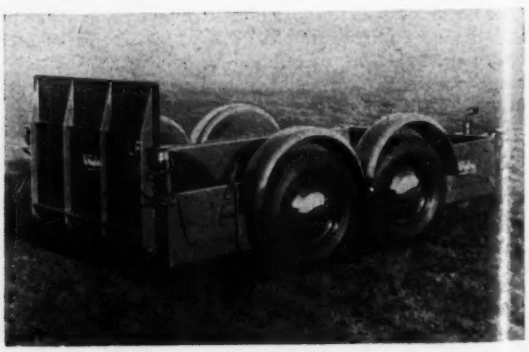
For mounting driven equipment, four tapped projections on the driving endshield can be machined to provide a spigot. Alternatively, extended through-bolts may be used to facilitate mounting at minimum additional cost. To comply with NEMA standards, the motors have a ⅝-in dia shaft extension. A number of improvements to existing f.h.p. motor design are incorporated.

The T.45 range is available for three-phase working at ratings from ¹⁄₁₀ h.p. at 960 rev/min to ½ h.p. at 1,425 rev/min. For single-phase working the range extends from ¹⁄₂₀ h.p. to ½ h.p. at the same speeds.

LOW-LOAD ROAD TRAILER

Specially designed for the transport of machinery or equipment or other bulky loads, the new Wrigley 3-ton low-load road trailer is of the four-wheel close-coupled type. It has an all-steel channel chassis and 5 ft × 2½-in towbar, a ¼-in steel plate platform, measuring 10 ft × 5 ft 7 in inside the 12-in-deep fixed timber sides and front board, and a 4-ft-high ¼-in steel plate hinged tailboard/ramp, strengthened and reinforced for loading machinery. The heavy plate hitch at the forward end of the towbar can be made to order to suit individual vehicles.

(*Continued on page* 429)



The Wrigley 3-ton low-load road trailer for transporting machinery, equipment and bulky loads

A Piccolift fork lift electric truck operated under confined space conditions

Flexitor rubber suspension units are mounted underneath to give unobstructed floor space. Rope hooks are fitted where required.

Other features are detachable steel disc wheels on 5-stud taper roller bearing hubs, 650 × 16 8-ply tyres, plated hub caps, vacuum-assisted hydraulic brakes on all wheels, with 11 in × 2¼-in shoes and bellows on the towbar, flexible hose and quick-action coupling to towing vehicle, with hand lever for control when manhandling, sheet steel cover protection, two independent hand levers controlling brakes on the rear wheels and a screw-operated combined lifting jack and jockey wheel on the towbar. The platform loading height is 12 in to 13 in and the approximate unladen weight 19 cwt. A 1-ton manually operated winch, with wire rope and hook, and a 12-ft-long platform are optional extras.

Manufacturers are Wessex Industries (Poole), Ltd., Dolphin Works, West Street, Poole, Dorset.

The three-phase supply monitoring relay developed by Lancashire Electronic Products, Ltd.

THREE-PHASE SUPPLY MONITORING RELAY

Developed by Lancashire Dynamo Electronic Products, Ltd., Rugeley, Staffordshire, the new Series MFR.1 three-phase supply monitoring relay is designed to provide protection against complete failure of one, two or three phases of a 380-440 V three-phase supply. It also includes facilities to provide a signal when any phase voltage is reduced to between 80 and 95 per cent of nominal voltage. At any set point in this range the protective relay will operate when the voltage falls to within ± 1 per cent of the set level.

The equipment was originally developed to operate in conjunction with automatic starters for stand-by diesel-alternator plant. In this application the relay monitors the public supply, and in the event of failure or reduction in voltage on the supply, the diesel set is automatically started and the main circuit-breakers operated to isolate the protected installation from the public supply.

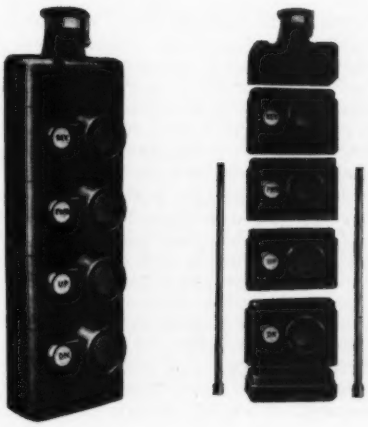
The relay is contained in a fabricated sheet steel case, the overall dimensions being 15½ × 11¾ × 6½ in. It can be housed in major control cubicles or fitted as a separate wall-mounted unit. Three long-life valves are used in the control circuits which are arranged to 'fail to safety'.

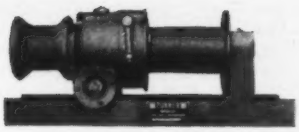
PENDANT CONTROL SWITCH UNIT

For use with cranes and other similar equipment, Nettle Accessories, Ltd., Harper Road, Wythenshawe, Manchester, 22, have recently introduced a new range of pendant remote control switch units suitable for any size of assembly, from one-way to eight-way. Each unit contains a push-button switch and indicator disc which can be inscribed with any one of eleven different words of instruction. Any wording which varies from the standard can be supplied at a nominal extra cost. The units are held together by a top and bottom segment with internally fixed bolts; the top segment has a cable clamp and the entry is designed for most standard cable thicknesses, and can be adapted for use with heavier conduit by cutting off the narrow neck of the entry. Each unit fits and locks together by means of lips and bosses which prevent relative movement of the units and make the whole assembly weather- and dust-proof. Being manufactured in Neoprene gives protection against ozone, oils, greases and solvents, complete insulation, virtual indestructibility and light weight.

Switches are rewirable and are of the single-pole double-break change-over type, rated for standard duty on the remote control of magnetic switchgear up to 600 V A.C. and D.C. Provision is made for securing straining wires to the top of the assembly so that no weight is carried by the Neoprene body or supply cable.

A four-unit pendant remote control switch assembly recently introduced by Nettle Accessories, Ltd.



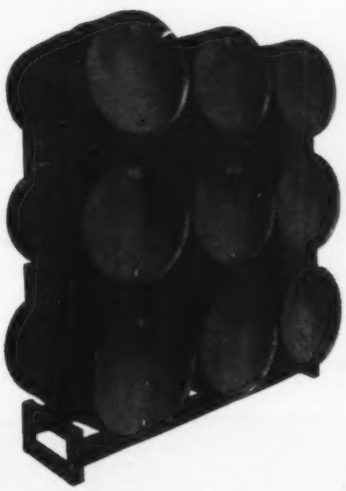


A Turner power-operated horizontal vehicle winch with capstan

POWER-OPERATED VEHICLE WINCHES

The Turner Manufacturing Co., Ltd., Wulfruna Works, Villiers Street, Wolverhampton, suppliers of military winches, announce an addition to their civil range of winches. This is a power-operated model of up to 5,000 lb capacity, suitable to be incorporated in any vehicle where winching is required. It is available as a capstan, horizontal winch and vertical winch. The capstan and vertical winch are ideal for front mounting and can be driven from the engine crankshaft with a special clutched drive unit. The worm shaft is mounted in taper roller bearings and the worm reduction ratio is 30 : 1.

On the capstan winch the capstan head, of 4·75 in dia, is of pearlitic malleable iron to withstand really hard wear. The rope drum barrel of the horizontal winch with capstan is of 4·5 in dia and the capacity is 150 ft of ⅝-in dia rope. The winch clutch is totally enclosed to keep out dirt and eliminates risk of the clutch rusting and seizing up. A fail-safe brake can be supplied.



A three-tier assembly of the new Powell drum pallet units

NEW DRUM STORAGE UNIT

The new design of drum pallet introduced by Powell & Co., Burry Port, Carms., South Wales, is constructed throughout with rectangular section hollow steel tubing. There are no crevices to hold moisture, and it is thus very suitable for use both outdoors and indoors. Each

unit carries three drums of 40-50 gallons size and is handled by a fork lift truck, the fork clearance being 2¾ in deep. Although strong enough to permit tiering 4 ft high, each unit is light enough for one man to carry. The units are symmetrical and reversible and, being very compact, permit safe and close packing of drums in the minimum possible space.

ELECTRO-MECHANICAL THRUST UNITS

Offered as alternatives to solenoids and hydraulic, compressed-air and vacuum-operated cylinders, the new self-contained electro-mechanical thrust units put on the market by the Gear Division of George Angus & Co., Ltd., Prince Consort Road, Hebburn-on-Tyne, under the trade name of Autoram, can be operated directly from standard A.C. electrical supplies, using standard types of switch-gear and eliminating the need for special power sources, such as air compressors and hydraulic pumps. Each unit incorporates an electric motor, totally enclosed reduction gearing and a ram which is extended or retracted by a screwed shaft and nut arrangement. A special limit switch device is normally fitted to control the stroke, and this can be adjusted to give any stroke length within the range of the unit. Units are available in various sizes, suitable for thrust loads from 0 to 5,000 lb with maximum stroke lengths to suit requirements, and for foot, flange or trunnion mounting.

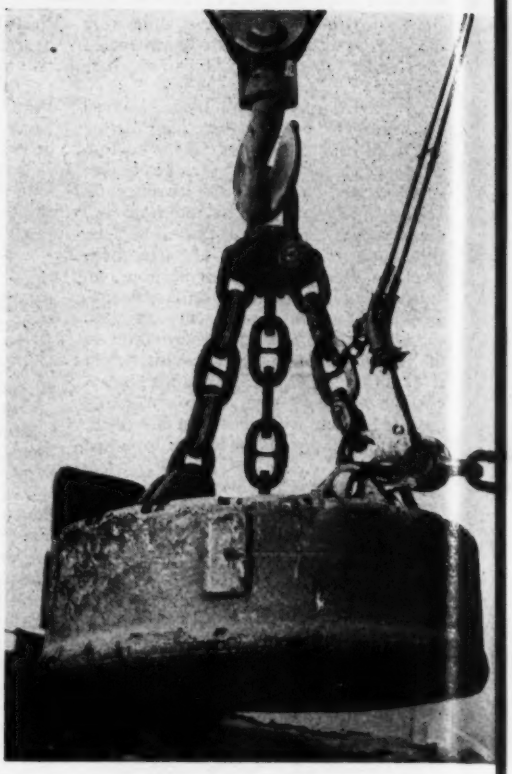
A heavy factory door application of the Autoram electro-mechanical thrust unit

The Epco Tondraulic 10-20 *cwt. hydraulic floor crane*

CIRCULAR LIFTING MAGNETS

Designed to meet the demand for greater weight per lift and to withstand exceptionally rough usage, the new Type SC Boxmag patent super-circular lifting magnets introduced by Electromagnets, Ltd., Boxmag Works, Bond Street, Birmingham, 19, are produced in three sizes of 57 in, 62 in and 67 in dia, with current consumptions of 60 amps, 83 amps and 95 amps respectively. The magnet is of super-intensity design, with shell and poles of high-permeability magnet steel, and magnetizing coil resiliently mounted and made up from several pancake coils of chevron section high-conductivity copper. Outer poles are of skirted design, forming part of the outer shell for additional strength. Inner poles are of deep, heavy construction. Both poles are spigoted and fitted with seals at the magnet shell joint. Of massive construction, with integral lifting lugs and terminal box, the shell provides sufficient radiating surfaces to dissipate heat.

Of the double-entry type, the terminal box is cast integrally with the shell, is fitted with an armour-plate cover and provides protection for the fixing bolts. Entry is through two compression glands, providing for single-core cable leads. A hinged steel cover protects the leads against damage from the sling chains and crane hook. The windings are of four-pancake design, with fireproof asbestos tape between turns. Each pancake is wound on to a solid gunmetal support ring and assembled on a silicone-impregnated resilient insulated metal former, with silicone-impregnated resilient insulation between pancakes. The coil is insulated with silicone varnish and is encapsulated by a robustly constructed bobbin. Other features are high-tensile steel through-bolts for the centre pole and studs for the outer poles, and manganese steel sling chains terminating in a ring designed for British Standard crane hooks.



One of the new Boxmag circular lifting magnets which has lifted steelworks' scrap weighing about 40 *tons*

NEW HYDRAULIC FLOOR CRANE

To the range of Epco Type C dual-purpose hydraulic floor cranes has been added a new 10-20-cwt model by Epco, Ltd., Star Works, Leeds, 7. Known as the Tondraulic, this is identical in size and capacity to the previous 10-20-cwt model but without the ability to be used in a floor socket and saving considerable cost where a single-purpose floor crane only is required. It will lift 10 cwt, 15 cwt or 1 ton to heights of 112 in, 97 in and 88 in respectively, according to boom position, and the respective minimum hook heights are 14 in, 23 in and 30 in. The overall length of base is 65 in, maximum base width 44 in, width between base legs 37 in, and weight 3¾ cwt.

NEW HYSTER LIFT TRUCK

Said to be the first lift trucks specifically designed for 10,000-lb and 12,000-lb capacities, the new pneumatic-tyred Challenger 100-120 series have been introduced by the Hyster Company, 1003 Myers Street, Danville, Illinois. They are fitted with the dual-range power-shift Hystamatic transmission, which offers the advantages of no clutch pedal, effortless direction changes and positive left-foot control of inching while the right foot maintains engine speed for fast lifting. The transmission is coupled to a torque converter with hydraulically actuated engaging units, selection of speed changes being made without de-clutching or stopping. Power steering is standard, affording full utilization of the short 134-in turning radius.

The six-cylinder Continental engine develops 85 h.p. at 2,800 r.p.m. and 192 lb/ft torque at 1,200 r.p.m. and a feramic-faced clutch, which can withstand a temperature of 1,200 deg, is available in combination with the standard three-speed synchronized transmission. A 12½-in dia custom brake is of exclusive design, and dual drive wheels are standard equipment.

(*continued on page* 431)

A Hirst Forager battery electric finger pallet truck handling goods in a warehouse

The improved version of the Muir-Hill L.H.1. loader has an extended lifting beam for loading high-sided vehicles

A two-pump hydraulic system, with built-in lock and lowering control valves, raises the load carriage at 60 ft/min. Other features include unitized body frame construction, variable-lap uprights with angled rollers for smoother operation and resistance to forward and lateral stresses of off-centre loading, easy accessibility to all motor components, a one-piece spring counter-balanced hood which opens wide to expose the engine, easily removed floor and seat support plates, giving access to the entire drive train, and a full selection of optional attachments.

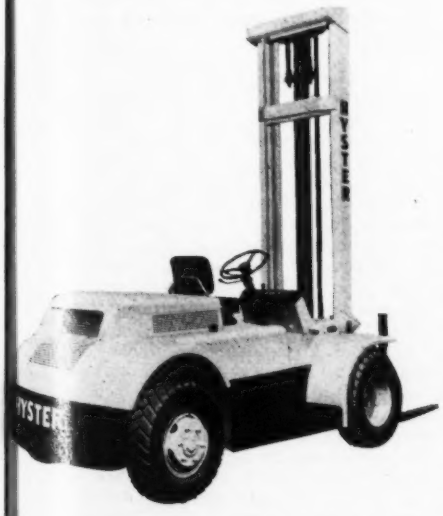
ELECTRIC FINGER PALLET TRUCK

The latest addition to the range of products of A. Hirst & Son, Ltd., 26 Brown Street, Manchester 2, is the Forager battery electric finger pallet truck of 2,000 lb capacity and 1,232 lb unladen weight. The height of the pallet arms is 3½ in when lowered and 8½ in when raised, giving a lift of 5 in. The 3½ in × 3½-in steel front wheels are mounted on roller bearings, and the driving and castor wheels have taper roller bearings and 7⅛ in × 3-in solid rubber tyres. The castor wheel pivots have taper roller bearings.

A 24-V heavy-duty traction motor, with current supplied by a battery of 105 amp/hr capacity at the 5-hour rate drives through a heavy-duty worm gearbox and duplex chain. With three forward and three reverse speeds the truck has travelling speeds of 1½ to 4 m.p.h. The rear wheels have a steering lock of 180 deg, and a transmission brake is applied by the control handle. The overall width is 30 in, overall length, with 48 in pallet arms, 75 in, and the ground clearance is 2½ in. A full automatic battery charger for wall mounting is supplied.

MUIR-HILL LOADER WITH EXTENDED LIFTING BEAM

The improved Muir-Hill L.H.1. loader, manufactured by E. Boydell & Co., Ltd., Old Trafford, Manchester, is now available with an extended lifting beam, designed to give greater scope in loading high-sided vehicles. The payload of this special model is restricted to 1,000 lb. Compared with the standard L.H.1 model, the lifting beam is extended by 15 in, providing an increase of 11 in in lifting height to the lip of a tipped 10·5-cu. ft. bucket. The maximum tipping clearance is 7 ft 2 in from the lip of the tipped bucket, while the maximum reach at the maximum lifting height is increased to 19½ in.



The new Hyster Challenger 100-120 series lift truck

TRADE NOTES

Martonair Conference

An International Conference held by Martonair, Ltd., was attended by delegates from Great Britain, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Holland, Italy, Norway, Sweden and Switzerland. In a welcoming address, C. D. P. Smallpeice, chairman, Martonair, Ltd., stated that the satisfactory position of the Martonair organization in the world to-day was due to the firm policy of producing good quality pneumatic cylinders and control valves at low prices, assisted by the effective interchange between countries of information relating to production methods, applications and technique.

Informal discussion followed formal papers read by various delegates concerning the production and uses of existing and future equipment. The conference closed with an open forum dealing with future trends and the entry of pneumatics into new fields.

Special Boom Handles Collapsible Rubber Containers

Industry is making increased use of collapsible rubber containers for the shipment and storage of chemicals and other bulk goods, applying the unit load principle to the handling of this material. *Sealdbins*, manufactured by the Container Products Division of the United States

Rubber Co., offer many shipping and storage advantages. They also present their own special handling requirements.

The Special Products Engineering Department of Hyster Co. have designed a means of handling the *Sealdbins* which range in size from 50 to 370 cu. ft. capacity. The result is the Hyster *Sealdbin* boom, an attachment which takes the place of load arms and carriage on Hyster lift trucks of rated capacities ranging from 3,000 to 20,000 lb. The boom and truck to be used would depend upon the size of the *Sealdbin* and weight of contents to be handled.

The boom features a ram-type hook with fairlead guides to facilitate positioning. Elevated to the proper height, the hook is slipped into a ring at the top of the rubber container. A sway brace, which may be folded out of the way, steadies the container while the truck is in motion. Optional is a hydraulic winch with cable hook for handling collapsed containers. Equipped with this boom, the lift truck can handily load and unload the bulky spheroids, carry them to and from storage, and position them for filling and emptying.

Hermetically sealed for maximum protection of contents, *Sealdbins* allow shipment and storage in the same weatherproof container. Less filling and emptying time is another advantage. The collapsible nature of the containers reduces the amount of return shipping space required. The *Sealdbin* 300, of 300 cu. ft. capacity, a popular size, has a diameter of 90 in when filled, and a suspended height of 107 in.

Dexion Exhibition

An exhibition was organized recently to show under one roof the wide range of Dexion products and accessories now available. Several new products were shown for the first time, including galvanized Dexion, Multi-purpose Grid and *Tecon* timber products. There was also a low-cost building system for overseas that drastically cuts and eliminates the need for a large skilled labour force and reduces construction time. This system, known as *Chee-Dex*, has been jointly developed by Dexion, Ltd., Overseas Division and Cheecol Processes, Ltd., of Reading. *Chee-Dex* buildings are claimed to be cool and less affected by condensation than normal buildings; they are intended chiefly for Central, East and West Africa, Middle and Far East and Latin America. Designs are available for hospital installations, houses, schools and industrial building.

The new multi-purpose grid can be used to construct anything from industrial platforms and mobile stairs to car ramps and trolleys. It is available in two sizes and is standard width. It can be quickly bolted together with fixing plates and standard Dexion nuts and bolts to suit almost any purpose where grid work or flooring is needed in any industry.

The new range of *Tecon* engineered timber products will, it is claimed, simplify the construction and reduce the cost of all types of roofs. The standard range of these products consists of beams, purlings, gutter units, decking units, roof units and truss components. The spacing of the beams can be at standard centres of 16, 24, 32 and 48 in.

Change of Company's Name

In 1949 when radioactive isotopes were made available by Harwell for commercial use, Baldwin Instrument Company were quick to appreciate their potential application for non contact thickness measurement and control of materials in continuous production.

Baldwins now offer the largest range of Nucleonic Thickness and Control Gauges available anywhere in the world, which are employed in industries as far remote as leathercloth and lacquer, tissue paper and tyres, and the manufacture of hot and cold ferrous and non-ferrous sheet and tube.

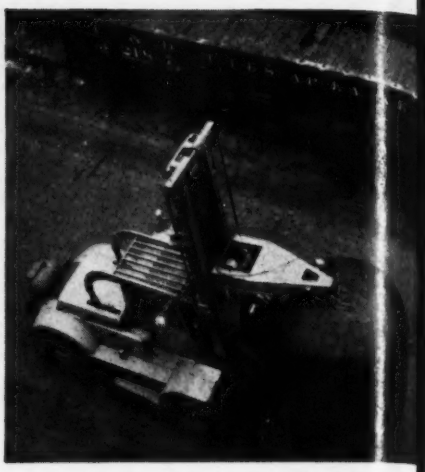
This venture, together with the development in 1954 of a Fluid Power Division which produces control and automative equipment for all types of industry, has widened the structure of the company's activities.

Expansion and development in these new fields has necessitated a recent move to much larger premises in the centre of Dartford and it became apparent that the title Baldwin Instrument Company was somewhat of a misnomer.

The name of the company has therefore been changed to Baldwin Industrial Controls, a title which more clearly illustrates the company's service to industry.

Airslide

It has been brought to our attention that *Airslide* and *F-H Airslide* are trade marks of which the Fuller Company of Catasanga, Pa., U.S.A., are the sole registered proprietors and of which Constantin (Engineers), Ltd., are the sole registered users in Great Britain. In the article 'Bulk Cement Handling Plant', which appeared in *Mechanical Handling* April 1959 issue, the equipment on page 197 should therefore have been more accurately described as 'aeration pads' and not *Airslides*.



Overhead view shows sturdy construction of the Hyster Sealdbin *boom. Container is 90 inches in diameter, is 107 inches high when suspended, and has a capacity of 300 cubic feet. Optional winch, used to pick up collapsed containers, can be seen*

A Viscount servicing dock made of Dexion has been built by New Zealand's National Airways Corporation to a Dexion design. The picture shows a mobile platform for dealing with the tail units of Viscounts. Dexion, Ltd., design aircraft servicing equipment for air lines in all parts of the world. A New Zealand company started to produce Dexion early this year

George Cohen Sons & Co., Ltd.

The above firm have been appointed by John Barnsley & Sons, Ltd., of Netherton, Worcestershire, as sole agents in Scotland, Ireland and South Wales for the Barnsley range of electric overhead travelling and Goliath cranes. As a result of this agreement, the lifting and mechanical handling department of George Cohen are now able to extend their already comprehensive range of light- and medium-capacity cranes into the heavy-duty category with overhead and Goliath cranes of up to 60 tons capacity and exceeding 100 ft in span.

With their service depots, strategically situated throughout the United Kingdom, at the disposal of Barnsley crane users, George Cohen Sons & Co., Ltd., are in a position to back sales with an on-the-spot maintenance, repair and spare parts scheme.

£1 million Russian Order

Over 25,000 h.p. of Crompton Parkinson motors are included in the £1 million Russian order recently received by U.D. Engineering Co., Ltd. The U.D.E.C. contract, which was awarded in the face of world competition, is for large-capacity refrigeration plants. Russia needs these for the implementation of her '7-Year Industrialization Programme'. Delivery of equipment will start before the end of this year and is due to finish before the end of 1960.

All the C.P. motors, over 22,000 h.p. of auto-synchronous power factor correction types and over 3,000 h.p. of induction types, are designed to suit the special requirements of the Russian installation. The motors will be manufactured in the Chelmsford works of Crompton Parkinson, Ltd. Compressor equipment for the order is being supplied by James Howden & Co., Ltd.

(*continued on page* 433)

Six of the big International Harvester BTD-20 crawler tractors with 124-b.h.p. Rolls-Royce engines, one to each lowmac rail wagon, being shunted from the company's sidings en route for Australia

A porter is seen loading packages on to trailers used in conjunction with the Robotug driverless trolley. A second Robotug can be seen on the left already loaded and beginning its journey unaided

£40,000 Tractor Shipment to Australia
International Harvester made their largest single shipment of BTD-20 crawler tractors from their Doncaster works recently. Six of these big tractors with 124-b.h.p. Rolls-Royce engines, one to each lowmac rail wagon, made an impressive sight as they were shunted from the company's sidings. IH has now built over 100 of this size of crawler tractor since production began last September, and is still working off a backlog of orders well in advance of this number. All but one of the units sold so far have been for use with special equipment in constructional engineering.

Agreement Between Fielden Electronics and Lancashire Dynamo Electronic Products
Fielden Electronics, Ltd., and Lancashire Dynamo Electronic Products, Ltd., announce, pursuant to agreement reached between them, that no level-control equipment manufactured or produced by Lancashire Dynamo Electronic Products, Ltd., of a type now or previously manufactured or produced by them nor the use of the same in any manner for level detection or control shall by agreement be regarded as infringing or having infringed any of the patents or patent applications of Fielden Electronics, Ltd. Similarly, no level-control equipment manufactured or produced by Fielden Electronics, Ltd., of a type now or previously manufactured or produced by them nor the use of the same in any manner for level detection or control shall by agreement be regarded as infringing or having infringed any of the patents or patent applications of Lancashire Dynamo Electronic Products, Ltd.

It is emphasized that this announcement is made as a result of the above-mentioned agreement and that it is strictly confined to the products of Lancashire Dynamo Electronic Products, Ltd., and Fielden Electronics, Ltd., respectively.

Goodyear Announcement
The Goodyear Tyre & Rubber Co. (Gt. Britain), Ltd., in conjunction with Electro Hydraulics, Ltd., announce a manufacturing agreement whereby Electro Hydraulics are producing all Goodyear designed wheel, brake and associated hydraulic equipment formerly produced at Wallasey. Under the new arrangement Goodyear retains responsibility for design, modification and repair of all equipment except the hydraulic brake controls, which will be designed and manufactured by Electro Hydraulics.

Goodyear's facilities at Wolverhampton and Hounslow are being expanded to provide increased sales and service in the U.K., and further to assist Goodyear's world-wide field organization with sales and service in the export markets. Aero tyre production is not affected by the agreement and will continue at the Wolverhampton factory.

This action is looked upon by Goodyear as a consolidation of their position in the industry and by Electro Hydraulics as an extension of their service, supplementing hydraulic systems and undercarriages with hydraulic brake controls.

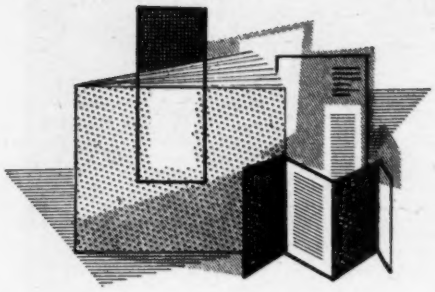
Emidec Computer for Sainsburys
J. Sainsbury, Ltd., one of Britain's leading grocery and provision companies, has placed an order with E.M.I. Electronics, Ltd., for an *Emidec* 1100 computer. Its principal use will be for stock control and central accounting for supplies to branches and it is believed to be the first application of a computer to the stock control problems of a chain of provision stores in Great Britain.

Sainsbury's head office and warehouse are situated at Blackfriars, London, and a centralized system of control enables a first-class service to be given to branches. By giving a finer control than can be achieved by conventional methods, *Emidec* will enable the existing organization to offer the same service as before to an ever-increasing number of branches, while continuing to maintain stocks at minimum levels to ensure perfect freshness. Varying buying habits in different types of districts and seasonal fluctuations in demand for certain lines can be catered for by the computer.

Blenders Installed at Quarry
Hilton Gravel, Ltd., one of the largest quarry proprietors and suppliers of sand and gravel in the North and East Midlands, have now installed a system of volumetric feeders at their Mercaston (Derbyshire) pit which is turning out between 800 and 1,000 tons of sand and gravel a day. The system consists of Parker 'Blenders' made by Frederick Parker, Ltd.; one of these is fitted to each of four of the storage bins which form part of the crushing, washing and screening plant installed in 1949. These bins are used for storing $1\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{2}$ and $-\frac{1}{4}$ in $+\frac{1}{4}$ in materials.

The feeders, which employ the natural fall of material through an adjustable gate and rotating paddles for discharging from the bins, have individual motors with 4-speed gearboxes. Each blender has an electronic warning device which cuts off supplies when the supply in any bin is getting low. The feeders can be used singly or grouped in any number to give continuous feed or intermittent fully blended batches and are accurate to within 2 per cent.

J. H. Fenner in Australia
S. B. Hainsworth, chairman and managing director of J. H. Fenner & Co., Ltd., has announced the formation in Sydney, Australia, of a manufacturing company for mechanical power transmission goods by means of an association between the Dodge Mfg. Corpn. of Mishawaka, Indiana, and the Fenner company in Hull. The new company, now operating in a modern factory of some 20,000 sq. ft. floor area at Revesby, New South Wales, is owned as to 60 per cent of its capital by the Fenner interests and as to 40 per cent by the American associates in the venture. Although there has been widespread technical co-operation between the two companies for almost 10 years, this is the first occasion on which there has been any financial connection.



ABSTRACTS AND REFERENCES

Articles on mechanical handling published in all technical and industrial journals of the world are indexed and abstracted below. Whenever it is known, the published price of the journal containing the article is given.

The addresses of the publications concerned are given and applications for copies of the journals mentioned should be made direct.

CRANE OVERLOADING PREVENTIVE
Overload Control Switch. *Distribution Age*, Chestnut and 56th Streets, Philadelphia 39, Pa., U.S.A. April, 1959. P. 46. 75c.

Reference is made to a sensitive control switch that protects electric hoists and cranes from accidental overloading. The load is not imposed directly on the chain but through a horizontal steel U-piece to which the chain and hook are attached. The control switch is mounted on the U-piece, housed in a moisture- and dust-proof junction box. As the crane load increases, opening movement of the U-piece causes the switch to shut off the current before the load reaches a predetermined danger point.

FOR HANDLING LONG LOADS
Two-Piece Hand Truck. *Distribution Age*, Chestnut and 56th Streets, Philadelphia 39, Pa., U.S.A. April, 1959. P. 48. 75c.

The handling of lengthy pallet, crate and other loads up to 500 lb is facilitated by a lightweight hand truck designed for use in pairs, one at each end. With a width of 14 in. and length of 4½ in, the forks have a 5 in vertical adjustment at 1 in intervals, and when raised, the load can be pushed wherever required on swivelling wheels.

POWER FOR HAND TRUCKS
New Power Wheel. *Distribution Age*, Chestnut and 56th Streets, Philadelphia, 39 Pa., U.S.A. April, 1959. P. 48. 75c.

For converting hand-propelled trucks to power propulsion without other alteration, a new power wheel is announced that can be permanently attached to a single truck or quickly coupled to any one of a fleet. Forward, reverse, steering and braking control are combined in one compact unit, and the wheel carries only its own weight and not that of the load.

HANDLING BULK MATERIALS
Screw Elevator. *The Engineer*, 28 Essex Street, Strand, London, W.C.2. May 15th, 1959. P. 776. 2s.

For handling 3 to 12 tons of bulk materials per hour with 1½-h.p. motor drive or ½ to 3 tons with a ¾-h.p. motor, a small screw elevator described has two opposed spirals in the feed hopper base. These feed the material into an inclined elevating spiral which, at four times greater speed, carries it up to a height of 5 ft 6 in or, with a fitted extension, up to 11 ft. A torque converter transmits the drive, and the speed of delivery can be widely varied. The 4½ cu. ft. feed hopper can be partitioned into two compartments so that two different materials can be mixed as they are delivered. Any required proportions are obtainable by varying the pitch of the feed spirals.

MARKING CONVEYED CONTAINERS
Conveyor Line Marker. *Package Engineering*, 185 N. Wabash Avenue, Chicago, 1, Illinois, U.S.A. May, 1959. P. 66. $10.

For automatically printing changeable data, such as codes, dating and trademarks on cartons, bags, cans, drums and other containers as they are transported on a conveyor, a friction-operated and self-inking marker designed for attachment to a conveyor line or case sealer is described. The printing height can be converted from 1 in to 2 in, and the unit can be applied singly or in multiple to mark both the top and sides or two sides of the containers.

HANDLING HOSES
Compressed-Air Hose-Handling at Fawley. *Fluid Handling*, 66 Victoria Street, London, S.W.1. April, 1959. PP. 105 and 106. 20s. per annum.

In this article are described the new installations of compressed air-operated hoists and winches employed at the Esso refinery at Fawley for handling hoses used for loading and unloading tankers. It is stated that they have revolutionized hose-handling technique and are responsible for a quicker turn-round of the tankers. Besides flexibility and safe working, the use of compressed air eliminates fire risk a vital factor where inflammable liquids are handled.

FILLING DRUMS
Automatic Drum Filler. *Automation*, Penton Building, Cleveland 13, Ohio, U.S.A. May, 1959. P. 110. $1.

Designed to handle 30-gal or 55-gal drums, the unit described can fill one thousand 55-gal drums in an 8-hour shift. Features are a tare weighing machine, automatic cut-off and single lance mechanism, raised and lowered hydraulically. It is a two-station machine, operating on a continuous basis. As empty drums are fed to it by a gravity conveyor, the machine locates and aligns the bung openings at the first station by hydraulically-operated rollers and positions the drums for filling. As each drum moves to the second station, the weight variation is automatically compensated for by the tare weighing machine, the filling lance is lowered and submerged filling begins at rates up to 270 g.p.m. Automatic flow reduction prevents overfilling, and safety devices stop filling in the event of a power failure, interrupted flow of empties, if a drum enters the line upside down and if the exit line becomes congested.

ROLLING WITH PNEUMATIC TYRES
Pneumatic-Tyred Roller. *Excavating Engineer*, South Milwaukee, Wisconsin, U.S.A. April, 1959. P. 58. 35c.

Designed for compacting duties on highways, airport runways, dams and building sites, a new seven-wheel pneumatic-tyred roller has four wheels in line driven in pairs by two propeller shafts and three steered wheels. The 13·00 × 24, 8-ply tyres have either smooth or block treads. A Cummins 125-h.p. diesel engine drives through a special transmission which includes a torque converter and gives three speed ratios and an infinite range of rolling speeds up to 19·4 m.p.h., forward and reverse. Adjustable swivelling operator's seats are fitted on the right and left and dual operating controls include hydraulic power steering. All the wheels are visible from the two driving positions. Pedal-operated hydraulic brakes are applied to the driving wheels and a mechanical transmission brake is also provided. By varying the ballast, wheel loads from 3,340 lb to 8,600 lb per wheel can be obtained.

AUGUST

The above issue

will contain the following:

Materials Handling, Plant Layout and Work Control in a small Factory

Report on the Hanover Fair

and regular features

SIDE FORK TRUCK HANDLING
Side Transfer Attachment for Fork Trucks. *American Machinist*, McGraw Building, 330 West 42nd Street, New York 36, N.Y., U.S.A. May 4th, 1959. P. 132. 75c.

A fork attachment that permits a fork lift truck to be loaded and unloaded at the side is said to increase the capacity of a storage installation by up to 60 per cent as the gangways there need to be only a few inches wider than the truck and load. It is traversed laterally above the front forks from the travelling to the loading and unloading positions, and the storage racks are provided with special load-bearing channels to relieve the truck of undue stresses and prevent overturning. A 6,000-lb capacity fork truck is required to side-handle a 4,000-lb load.

RECENT PATENTS

The following are brief extracts of recent United Kingdom patents which we believe will interest our readers. For full details the original patent specifications should be consulted at, or bought (3s. 6d. each) from, The Patents Office, Southampton Buildings, Chancery Lane, London, W.C.2.

BOTTLE CORKING
J. Lynch, of Dublin.—U.K. 808650.

Device with ready conversion for use with crown or cylindrical corks.

SHIPS UNLOADING
Clifford Hartley Patents, Ltd., of West Byfleet.—U.K. 808675.

Pipeline to tankers, raises from sea-bed, with a pivoted structure buoyanced to near vertical but sinkable by flooding as required.

COLLAPSIBLE CONTAINER
Hamlin Metal Products Corporation of Akron.—U.K. 808676.

Rigid container for bolts, castings, etc., used in goods trucks or wagons, easily collapses, walls cannot be lost and can be lifted by forks collapsed or not.

BISCUIT MAKING
E. T. Oakes Corporation, of Long Island.—U.K. 808720.

Sandwich cakes or biscuits made by accurate positioning and registration of layers, using a multi-level conveyor fed from trough with coating before junction, which is controlled by pusher plates.

PNEUMATIC CONVEYOR
J. Lyons & Co., Ltd.—U.K. 808750.

Fragile articles, e.g. plastic caps, lifted and fed into air jet for upward movement.

HAND CART
Somafon S.a.r.l., of France.—U.K. 808754.

A two-wheeled hand cart with pivoted body mounted on a frame, in the form of a truncated pyramid, which tips by manual pressure on the shaft, can be turned upside down or returned to normal.

FLOAT SEPARATION
Märkische Steinkohlengewerkeschaft, of Germany.—U.K. 808914.

Using conveyorized discharge automatically controlled for the heavier portion, by auto-flaps or floats feeding the buckets.

PEELER
Prestige Group, Ltd., of Holborn.—U.K. 808969.

A fruit or vegetable peeler without water or drainage supply needs, using a self-cleaning rotary disc.

TORQUE CONVERTER
P.M.G. de Teremala, of Berkshire.—U.K. 808972.

A crane propulsion unit with torque converter and reduction gear.

BALLAST CLEANING
Veb Schwermaschinenbau Heinrich Rau, of East Germany.—U.K. 808987.

Railway ballast cleaner with bucket conveyor, works without underpinning and can be quickly dismantled from track to let trains by—slides vertically and transversely.

PALLETS
Vitrolec, Ltd., of Birmingham.—U.K. 808992.

A metal coil pallet with extended legs at corners for holding coils and channel supports across both ways for added support and strength.

FLOOR CONVEYOR
Massey Harris Ferguson Inc., of Wisconsin.—U.K. 809022.

Trailers with floor conveyor, driven from a rear cross shaft.

GRAIN FEED
Kooperativa Forbundet Ekonomisk Forening, of Stockholm.—U.K. 809057.

Level in hopper kept constant, e.g. as for pressure feed to screw conveyor or pneumatic pipe, using a hopper with a rotating blade in its bottom, lifting and dropping material under its own weight.

CONVEYOR BELTS
Dayton Rubber Co., Ohio.—U.K. 809104.

Pulley-driven belts for car polishing at works giving even load distribution, with an inner rubber surface in compression for drive—and an outer-tension surface.

FIBRE FEED
Fleissner & Sohn Maschinenfabrik, of Frankfurt.—U.K. 809134.

Fibre feed for textile processing with simple series of three conveyors, and lever change to by-pass one machine if required, by feeding from high level direct to lower one.

HYDRAULIC CRANE
R. L. Larson, Norway.—U.K. 809149.

Carriages on railway or cables, moving in opposite directions, parallel and with separate winches, e.g. for timber moving. When braking occurs this acts as a pump for the other circuit.

COAL SLURRY
Pittsburgh Consolidation Coal Co., U.S.A.—U.K. 809167.

Improvement on patent 771618 for long-distance transportation of coal in carbon steel pipe at 1,200 p.s.i.g. and with a wall thick enough to withstand corrosion. Corrosion is reduced by adding chromate at 12 p.p.m. to the water with a pH above 5, and preferably a trace of phosphate ('calgon') also.

REFUSE CARTS
N.V. Nederlansche Tank Apparaten en Machinefabriek Netam, Rotterdam.—U.K. 809172.

With a device to prevent any jumping from suspension even when the cart is shaken upside down.

SHEET STACKING
Western Printing & Litho Co., of Wisconsin.—U.K. 809212.

Magazines and flexible papers are collected from a high-speed web press and stacked in accurately aligned piles of variable size by pulling sheets of a conveyor sideways, using a differential conveyor speed.

BOTTLE HANDLING
G. F. Shimeild, of Islington.—U.K. 809223.

Empties in public houses, etc., disposed into chutes with pivoted spring-loaded flaps at ends, giving zigzag shock absorbing fall to a low level.

FEED DEVICE
International Cigar Co.—U.K. 809261.

High-speed cigar wrapper with feed from an 'outer' type sheet, accurate timing and feed grip controlling web cutting.

SHEET HANDLING
Courtaulds, Ltd., London.—U.K. 809292.

Continuous flow to dissolver tank from bales of sheets—e.g., wood pulp, with stacks fed to a picker with low-speed drive which operates a high-speed one when stock empty, self-disengaging when stock is present. The conveyor stock feed is controlled by a cradle switch, an improvement on patent 549610.

SLAUGHTER FEED
Geo. A. Hormel & Co., of U.S.A.—U.K. 809342.

A conveyorized arrangement of pig, etc., bleeding whilst slowly moving, with appropriate sticking at right places, blood collection and animal holding to prevent internal bleeding.

WINDER CONTROL
General Electric Company, London.—U.K. 809415.

A depth indicator remote control using an improved Selsyn system.

BELT CONVEYOR
North Thames Gas Board, of Kensington.—U.K. 809453.

A coal or coke inclined belt conveyor using two opposed perforated belts sealed at the edges by pressure rolls to give satisfaction at steep inclines.

LIFT TRUCK
Conveyancer Fork Trucks, Ltd., of Warrington.—U.K. 809461.

Reach truck designed to keep the centre of gravity at all times well within the effective three-point base, suspension.

LABELLER
Morgan Fairest., Ltd., of Sheffield.—U.K. 809463.

Machine with automatic date marking on bottle labels, continuous with filling, e.g., in breweries, with a marking cylinder eccentric to drum axis, the whole being on a pivoted bracket.

WRAPPING
Rose Bros. Gainsborough, Ltd., Lincoln.—U.K. 809468.

Sweet packaging somewhat as per patent 729223, using a pocketed wheel

feed with a deflector for surplus reconveyance back to feed grooves.

LABELLER
Geo. J. Meyer Manufacturing Co., of Wisconsin. U.K. 809475.

A wrap-around labeller, e.g., for ketchup bottle necks, capable of doing many simultaneously, somewhat as per patent 805074, with a bottle being wiped by a series of bushes in turn, whilst moving with label applied, each wipe doing a segment successively more than right round the side.

CAGE SIGNALS
Standard Telephones & Cables, Ltd., London.—U.K. 809524.

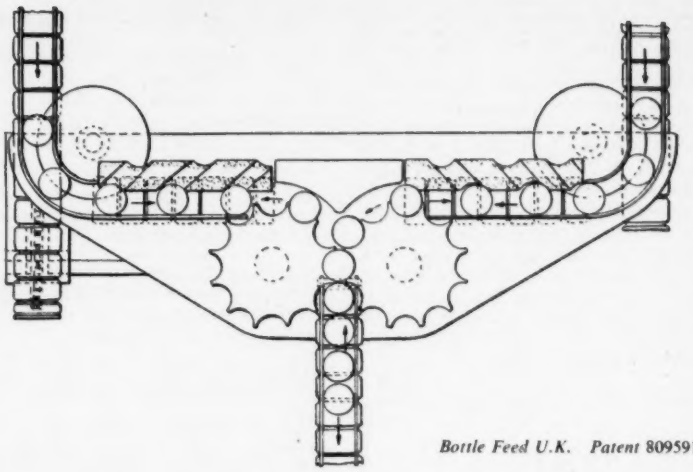
An improvement on patent 808541 for telephone communication at all times with mine cage using an A.C. system with inductive coupling to the winding cable.

TRUCK CASTORS
Yale & Towne Manufacturing Co., of New York. U.K.—809554.

A mounting for corner drive of heavy propelled trucks to reduce power resistance on sharp turns or reversal, using bearings with tilt and spring arrangement.

BOTTLE FEED
Crown Cork & Seal Co., Inc., of New York.U.K.—809591.

Article fed from multi-channel line to a single filling conveyor, e.g., for beer bottles, with prevention of upset or damage at junction, or foaming and troubles due to supply delay. The control apparatus uses worm feed to common intermeshing wheels with semi-circular openings to accept and feed on to a single line.



Bottle Feed U.K. Patent 809591

MOBILE HOIST
J. C. Payne, of Oxford.—U.K. 809611.

Manœuvrable mobile hoist to insert a patient into a vehicle, etc., comprising a truss mast and pivoted jib on a wheeled U-base frame.

BAG FILLING
St. Regis Paper Co., of New York.—U.K. 80961

Granule filling with conveyorized to sewing equipment avoids dust wastage with bag grippers urging closing against inserted spouts.

HATCH COVER
Deutsche Werft A.G., of Hamburg.—U.K. 809625

With total guide during rocking motion which withstands rough handling at sea for long periods. Covers tilt up and collect in a small space.

SUMMARY OF CONTENTS—*continued*